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THE INDUCTION, COMPLICATED BY HEMORRHAGE, OF LABOR*

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THE induction of labor has established its place among the most valuable operations of obstetric surgery. The indications for its performance have, of late, been considerably changed by the increased performance of cesarean section and by the more frequent use of analgesia and anesthesia in labor. The distinction between the induction of labor and the emptying of the uterus by dilatation and curetting, or by elective operation, must not be forgotten.

At present, in primiparous patients labor is rarely induced for contracted pelvis, but is indicated in cases where pregnancy is turning the scale against the general health of the patient and where the saving of health or life may be hoped for if pregnancy is terminated. Such are cases of disease of the heart complicated by pregnancy, tubercular infection complicated by pregnancy, toxic conditions not yielding to treatment, and where a profound disorder of the nervous system is greatly aggravated by pregnancy.

In multiparous patients, induction of labor is more frequently indicated. In cases where patients have had several difficult labors with children disproportionate to the mother's pelvis; in cases where, after having several children, the mother shows a tendency to go overtime, and in cases of severe visceral disease in multiparous patients, labor is often induced.

In placenta previa, labor may be induced to advantage when the

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situation of the placenta is such that rupturing the membranes alone will suffice to control hemorrhage through pressure by the presenting part. In other cases of placenta previa and in accidental separation of the normally implanted placenta, delivery by section is indicated.

In fulminant toxemia, with or without convulsions, induction of labor is only indicated when the patient is practically in and has largely completed the first stage of labor. Then the rupture of the membranes will be followed by the temporary cessation of the convulsions, which will return with increased violence when the uterus begins to act.

Two methods at present are commonly employed: one, the introduction of a foreign body within the uterus to stimulate uterine contraction, or the stimulation of the uterine contractions by rupturing the membranes and lessening the quantity of amniotic liquid, or, second, the administration of drugs. The induction of labor by psychic effect, while occasionally successful, is unreliable.

In inducing labor, it is well not to ignore the mechanism of labor. The unshortened and unsoftened cervix requires something more than simple stretching in a lateral direction at right angles to the long axis of the uterus. The dilating bag does not favor the softening or retraction of the cervix, and this is one of the disadvantages attending this method. The introduction of bougies or a rectal tube, or gauze promotes the softening of the cervix, its retraction and obliteration, and is not likely to displace the presenting part. This method is not especially painful, or likely to result in septic infection.

If the statement of patients can be believed, the use of dilating bags causes severe pain and sometimes tends to displace the presenting part. Accidents in the use of the bag, resulting in the bursting of the bag and the escape of liquid or air into the uterus need not result seriously.

It has been urged as an objection to the use of bougies that they may separate the placenta or pierce or wound the tissue at the placental site in such a manner as to cause hemorrhage. This paper is largely concerned with the discussion of this topic.

Before narrating our cases, it may not be amiss to call attention to the induction of labor by the use of drugs. Castor oil, quinine and pitnitrin are those commonly selected. This method has received full exposition by Watson of Toronto, who publishes a considerable series of cases and is satisfied with his results. Choosing a favorable time, he gives castor oil, quinine dissolved in dilute hydrochloric acid, and follows this by small doses of pituitrin, given sufficiently often to initiate and continue uterine contraction. When labor has once been established, it is allowed to proceed, if possible, spontaneously.

In the administration of drugs, the psychic element can rarely be

completely eliminated. If a patient is positively told that certain effects will follow the taking of a given drug, such effects are enhanced. Of this, the writer had an interesting illustration when a patient, a trained nurse, who married a physician, and who presented a moderately contracted pelvis, desiring to avoid operation, consented to the induction of labor. The patient was familiar with the circumstances and the reasons for the proposed interference. All preparations were made for a given day. The only medication employed was a simple laxative. Without interference or the further use of drugs, the patient came into labor at the time appointed. Furthermore, the patient repeated this performance twice afterward, on each occasion the preparations for inducing labor were fully carried out, the result being a psychic effect which produced the desired result.

We recognize hemorrhage during pregnancy as that which is not concealed and in which blood escapes through the vagina, or that which is concealed, where blood accumulates in the uterus, in the abdominal cavity or between the layers of the broad ligaments. In the writer's experience with the induction of labor, hemorrhage has occurred and the cases seem of sufficient interest and importance to justify their narration.

CASE 1. A woman whose first pregnancy had been terminated by the use of forceps. In her second pregnancy, domestic complications had caused great nervous disturbance; the patient's general physical condition was impaired and she had gone overtime, with no sign of labor. She entered the Jefferson Hospital and under anesthesia by nitrous-oxide and oxygen, the cervix was dilated somewhat by the gloved hand, the membranes separated from the lower portion of the uterus and two bougies were inserted without difficulty. The fetal head was presenting, but was freely movable at the pelvic brim. The introduction of the bougies was followed by considerable oozing hemorrhage, the blood was dark in color, the quantity not excessive. The bougies were introduced in the afternoon. A vaginal packing of ten per cent iodoform gauze was used. During the night and the following morning, hemorrhage persisted, although of moderate quantity. Labor did not develop. There was no evidence of placenta previa, neither was the patient highly toxic. The patient had been, before marriage, a trained nurse, and understood thoroughly the points in her case.

In view of the hemorrhage, the failure of labor to develop and the fact that the patient's circumstances in life were such that each pregnancy must be an extraordinary burden, the patient and her husband requested delivery by operation, with sterilization. This was readily accomplished by abdominal section, followed by the delivery of the child and supravaginal hysterectomy. The ovaries were left, the appendix was removed. Mother and child recovered from the operation without incident.

On examining the uterus, it was lined with an extraordinarily thick and soft membrane. At the time of operation, it was observed that the placenta had not separated, nor had the bougies touched the placenta, or done violence. They were in proper position between the membranes and the wall of the uterus.

A thorough microscopic examination of the specimen revealed the cause of the

hemorrhage. The patient had chorioepithelioma, the microscopic appearance of the uterus being highly characteristic of that condition.

The patient was last seen five years after the operation in good general condition.

CASE 2.—A remarkably robust multipara, who had given birth to large children with considerable difficulty and suffering. The essential element seemed to have been the excessive size of the child. Accordingly, in the fourth pregnancy, it was determined to induce labor at term. The position and presentation were normal, the pelvis was slightly larger than the average, the membranes unruptured, the patient's general condition good. Under nitrous-oxide and oxygen anesthesia, the cervix was dilated by the gloved fingers, the membranes separated, a thorough examination made, which revealed no abnormality. Two bougies, one after the other, were then inserted very gently and carefully, passing up on the left side of the pelvis between the membranes and the wall of the uterus. The introduction of these bougies was followed by a hemorrhage so profuse that the sound of the blood pouring into a bucket beneath the edge of the bed was distinctly heard. A vaginal packing of iodoform gauze was at once introduced and the abdomen again examined, and evidence was found that the placenta had begun to separate. The husband of the patient was immediately notified of the condition and the patient was delivered by abdominal cesarean section. It was feared that the bougies had separated the placenta, pierced its substance, or done some important injury.

On section the bougies were in the position to which they had been introduced on the left side of the uterus, the placenta was attached on the right upper portion of the uterus and had begun to separate. There was no connection then between the bougies and the separation of the placenta, unless it was that the bougies had set up uterine contraction which began the separation of the afterbirth. The uterine decidua seemed unusually friable and the placental substance contained considerable calcareous matter. A vigorous child was readily delivered, the uterus emptied and sutured by closing the muscle with buried stitches of medium-sized, best quality silk, stitching over the peritoneal covering of the uterus with continuous catgut and closing the abdomen in the usual manner. The patient's recovery was uncomplicated and she nursed her child successfully. The placenta had separated through about one-fourth of its lower portion.

It may be interesting to note that within two years after this operation, this patient gave birth to a living child, well-developed, with very little assistance. Labor developed at term, and when dilatation was complete, the membranes were ruptured and the patient completely anesthetized with ether and oxygen. Vigorous uterine contractions developed, which brought the head to the pelvic floor, whence it was readily extracted by the hands. The placenta was immediately removed by introducing the hand within the uterus and the interior of the uterus was thoroughly palpated. No evidence of the former operation could be detected. Mother and child made an uninterrupted recovery.

In this case had the woman not been in the first instance delivered by section, it might always have been supposed that the bougies wounded the placenta or partially separated it. It was absolutely proved by direct vision that the bougies did not touch the placenta, nor were they even on the same side of the uterus.

CASE 3.—A multipara whose first labor had been difficult, terminated by forceps, with considerable laceration. To avoid further complications, as a complete repair operation had been done, it was decided to induce labor in a subsequent pregnancy. The pelvis was of average size, the presentation and position favorable, the patient's general condition good. Nitrous-oxide and oxygen were administered, the cervix dilated, the membranes separated and two bougies inserted. There was considerable

hemorrhage accompanying their insertion.   This readily ceased on the introduction
of the vaginal packing with ten per cent iodoform gauze.   Labor developed within
eight hours and was terminated by the use of forceps.   A living child was delivered,
without difficulty, and mother and child made good recovery.   The cause of the
bleeding could not be ascertained; the placenta was intact, no wound or lesion of
the cervix or uterus could be found.

CASE 4.—Bougies were introduced to induce labor in the case of a patient in the
wards of the Maternity Department of the Jefferson Hospital.   No complication
attended their introduction; the patient went into labor, was delivered spontaneously.
When the placenta was delivered, one of the bougies was sticking through its sub-
stance, having perforated the placenta completely.   This condition would not have
been discovered by any symptom or complication arising during the labor.   There was
during the labor no hemorrhage whatsoever.

One can readily understand that if the placenta be attached unusu-
ally low it might easily be wounded by bougies, and hemorrhage re-
sult.   Any cause which produced uterine contraction in a toxic patient,
or one whose decidua was diseased, might result in separation of the
placenta.   Chorioepithelioma would certainly bleed if bougies were
introduced into such a uterus during pregnancy.   In case three, how-
ever, where no complication could be found and slight hemorrhage oc-
curred, an explanation for the hemorrhage is not forthcoming.

It may be suggested that the use of a new sterile rectal tube which
does not pass beyond the lower uterine segment is safer than the use
of bougies.   The writer has employed this method with satisfaction in
several cases.   It is not, in his experience, as prompt in its action, nor
does it soften the cervix so thoroughly as the use of bougies.

From his experience, the writer is not inclined to believe that the
use of bougies does cause serious hemorrhage.   On the whole, in his
experience, this method has been the most uniformly successful of
any employed for the induction of labor.   It has produced the result
of more closely resembling spontaneous parturition than any other.

The literature on the subject throws no light upon the question.
Cases are recorded where the placenta has been lower than usual
and bougies have wounded the placental tissue, but the writer has
been able to find no case where serious injury to mother or child has
followed the use of bougies in the induction of labor.

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SOME CHEMICAL STUDIES IN NORMAL AND ABNORMAL PREGNANCIES*

1. SIGNIFICANT CHEMICAL CHANGES IN THE BLOOD IN THE TOXEMIAS OF PREGNANCY

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WITHIN recent years metabolism in pregnancy and the causation of the toxemias during this period have been the subject of numerous investigations. The results obtained, however, have left much to be desired. Some workers have attempted to establish an acid intoxication as the cause of eclampsia. Zweifel[1] reports a case of pregnancy toxemia in a primipara, in whom after four convulsions he isolated in considerable quantities sarcolactic acid from the urine, maternal and fetal blood, and the placenta. The concentration of this acid in the maternal venous blood was found to be 0.008 per cent, but 0.025 per cent in the blood of the umbilical cord. It would appear, then, that the maternal organism absorbs sarcolactic acid from the fetus and thus an acid intoxication results. However, subsequent workers have shown that the excretion of lactic acid is not characteristic of eclampsia, and in this condition is probably due to the epileptiform convulsions. Hasselbalch and Gammeltoft[2] working with hydrogen-ion concentration of the blood and the carbon dioxide tension of the expired air have found during normal pregnancy a compensated acidosis, but in some cases of eclampsia an uncompensated acidosis resulting in a definite increase in the hydrogen-ion concentration of the blood. Of eleven cases of pregnancy of nearly full term, examined by Menten[3] the blood serum of one showed an increased alkalinity, but in the remaining no deviation from the normal. Recently, White[4] has reported some interesting results upon alkali tolerance as a measure of the acidosis in pregnancy toxemias. With Sellards' method[5] he has determined the tolerance for sodium bicarbonate in normal pregnant cases to be 6.8 gm., slightly above the normal for nonpregnant patients. The average tolerance for cases of pregnancy toxemias that eventually recovered was 45.3 gm., while that for toxemias terminating fatally was 67 gm., and finally pregnancy complicated by nephritis had an average tolerance of 33 gm. Losee and Van Slyke[6]

determined the percentage volume of carbon dioxide bound in the form of bicarbonate in the blood plasma in 14 cases of normal pregnant women. All gave figures below 65, and 10 below 55. However, the cases of toxemia of the eclamptic and vomiting type showed only a slight variation from normal in the alkali reserve of the blood plasma, in spite of the fact that in some cases the ammonia excretion was greatly increased.

As a further index of the acidosis, considerable attention has been devoted to the ammonia excretion in the urine. It was noted by Hasselbalch and Gammeltoft[2] that although the titrable acidity of the urine was decreased, the ratio of the ammonia nitrogen was increased during pregnancy, but after parturition this returned to normal. The ammonia excretion was determined by the formol titration method. Losee and Van Slyke,[6] and as well Ewing and Wolf,[7] have reported an increased excretion of ammonia, with a markedly decreased elimination of urea. In the cases of pernicious vomiting this was particularly evident. Wilson[8] has observed a tendency towards an increase in the ammonia nitrogen in the last weeks of pregnancy. Further, while Williams[9] has stated that eclampsia is characterized by a marked decrease in the amount of nitrogen excreted as urea, but a definite rise in the quantity eliminated as ammonia, Murlin and Bailey[10] have found no greater ratio of ammonia N in toxic than in the last month of normal pregnancies. Since Sellards[11] has established the fact that the excretion of ammonia may be normal in acidosis, and on the other hand, the ammonia eliminated may rise to 2 gm. per day without any other evidence of acidosis, obviously the determination of the quantity of this compound excreted, and of the ammonia coefficient is not a reliable index of an existing or suspected acidosis. Again, Underhill and Rand[12] have pointed out that the composition of the urine in pernicious vomiting is strikingly similar to that found in inanition, and following the administration of carbohydrate by mouth or by rectum there is a distinct tendency towards a resumption of the normal elimination of the ammonia.

In contrast to these apparent contradictions, we find a greater uniformity of the results of investigations of the chemical composition of the blood in these conditions. In a preliminary report, Folin[13] states that the urea nitrogen of the blood of pregnant women varies from 5 to 9 mg. per 100 c.c., and the nonprotein nitrogen, except in toxic cases, does not exceed 30 mg. The urea nitrogen, then, forms 20 to 35 per cent of the nonprotein nitrogen. In 35 normal obstetrical cases, Slemons and Morris[14] found the average nonprotein nitrogen to be 25.2 mg., whereas the average urea nitrogen was 10.4 mg., 44 per cent of the nonprotein nitrogen. The lowest urea nitrogen observed was 8.4 mg. Recently Caldwell and Lyle[15] in a series of 150 carefully selected, normal, pregnant women, (from seven to nine months' gesta-

TABLE I

Chemical Changes in the Blood in Normal Pregnancy and Pregnancy Toxemias **

CASE	AGE	PARA	MOS. OF GEST.	NON-PROTEIN-N M.G. PER 100 C.C.	UREA-N M.G. PER 100 C.C.	UREA-N PER CENT	URIC ACID	CREATININE M.G. PER 100 C.C.	SUGAR	CHLORIDES PER CENT	CO2 COMBINING POWER	PROTEIN	CASTS	SYSTOLIC	DIASTOLIC	REMARKS
Normal Pregnancies																
1-A. P.	20	I	5½	25	11	25	2.0	2.3	0.13	0.48	42	++	–	130	90	
2-N. ?	25	I	7½	25	11	46	2.6	2.1	0.10	0.46	49	+	–	120	70	
3-E. ?	23	I	8	24	10	47	2.5	2.2	0.11	0.48	44		–	110	90	
4-E. Q.	27	I	8	22	10	44	1.9	2.2	0.10	0.48	39	+	–	130	90	
5-M. N.	33	III	8	21	9	44			0.10				–	130	85	
Nephritic Toxemias																
1-C. Q.	27	III	6½	106	72	67	8.1	3.7	0.12	0.42	40	++++	–	210	140	Neuroretinitis. No edema. Delivered by bag. Improvement slight.
2-C. C.	32	III	7½	46	26	57			0.14	0.50		++++	++	190	110	Neuroretinitis. Slight edema. Slight improvement after Cesarean.
3-A. P.	33	II	8	45	28	62	4.8	2.1	0.12	0.47	43	++++	++			Neuroretinitis. No edema. Delivered by forceps. Improvement slight.
4-M. C.	35	IV	7	29	15	51	5.3	2.6	0.11	0.52		++++	–	200	120	Neuroretinitis. Marked edema. No convulsions. Cesarean. Improved.
Hepatic Toxemias																
1-C. B.	22	I	3	34	12	33	3.0	1.9	0.12	0.47	28	+	–	130	90	Pernicious vomiting. No convulsions.
2-N. O.	27	II	3	36	8	15		1.6	0.14	0.41	42	+	–	110	70	Pernicious vomiting. No convulsions.
3-B. W.	25	I	9	30	5	16	8.5		0.10	0.63	16	++	+	165	100	Convulsions began 3 hours postpartum.
4-M. B.	21	I	9	36	11	32	4.8	1.9	0.15			++	–	195	105	Convulsions began 1 hour postpartum.
5-J. H.	20	I	9	37	10	27	3.8		0.09	0.59	42	++	–	180	120	Convulsions began 2 days postpartum. Died.
6-H. S.	22	I	9	48 / 26	15 / 13	32 / 50	7.3 / 3.5	1.8 / 2.1	0.13 / 0.12	0.46 / 0.50	28 / 40	++ / +	+ / –	190 / 100	100 / 65	Convulsions began 2 hours postpartum. 14 days later. Improved.

TABLE I—CONTINUED

Case																Remarks
7-L. T.	33	11	9	58	11	17	4.3					+	+		185	115	Convulsions began 1 hour post partum. Died.
8-M. E.	27	1	7	31	13	36	11.0	2.5	0.13		38	+ +	+	210	140	Severe convulsions. Stillbirth. Died.
9-Y. H.	28	1	7½	35 / 23	9 / 12	27 / 51	6.8 / 2.5		0.12 / 0.09		38 / 53					Severe convulsions. Stillbirth. 5 days later. Improved.
10-M. B.	29	III	9	36	9	22	4.5	1.9	0.12	0.52	26	+ +	+	175	105	Convulsions. Edema. Stillbirth.
11-B. R.	33	1	9	36	12	34	3.6	1.7	0.17	0.47	34	+ +	—	140	85	Mild convulsions. Fetus toxic.
12-H. B.	32	III	7	37	11	34	6.5		0.10	0.58	40	+ + +	+			Severe convulsions. Stillbirth.
13-D. M.	22	1	8	37	11	29	5.0		0.14	0.47	37	+ +	+			Severe convulsions. Fetus toxic.
14-F. H.	27	1	7	38	10	29	3.4	2.3	0.10	0.61	12	+ +	+	150	115	Severe convulsions. Edema. Died.
15-E. R.	32	1	7½	39	12	30	7.5	2.5	0.13	0.47	40	+ + + +	+ +	164	100	Severe convulsions. Stillbirth.
16-R. W.	24	11	8	10	6	16	6.8	2.5	0.13	0.55	36	+ +	+	185	100	Severe convulsions. Slight edema. Stillbirth.
17-E. P.	20	1	7½	10	6	16	6.9	2.2	0.12	0.52	30	+ —	+	220	118	Severe convulsions. Slight edema. Stillbirth.
18-N. L.	21	II	7	47	14	29	5.4		0.12	0.63		+ +	+ +	160	88	Severe convulsions. Marked edema. Stillbirth.
19-A. B.	21	1	9	50	9	18	5.6	2.2	0.18	0.52	21	+ +	+ +	195 / 175	145 / 135	Very severe convulsions. Fetus toxic.
20-A. C.	18	1	5	61 / 90	18 / 43	28 / 47	7.5 / 3.2	1.7 / 3.7	0.12	0.50 / 0.61	26 / 52	+ + / + +	+ + / + +	195	110	Very severe convulsions. Stillbirth. 8 days later. No improvement. Edema.
21-M. R.	21	1	7	56	22	38	6.8	2.7	0.11	0.52	20	+ +	+	210	110	Very severe convulsions. Edema. Stillbirth.
22-B. S.	26	1	6½	64	22	32	8.6	2.5	0.10	0.42		+ +	+			Very severe convulsions. Stillbirth.

tion), reported the average nonprotein nitrogen to be 25 mg., 38 per cent of which was urea nitrogen. Losee and Van Slyke[6] found the nonprotein nitrogen in 10 cases of eclampsia to range from 25 to 46 mg., the urea nitrogen from 10 to 26 mg., and the amino acid nitrogen 4.4 to 7.9 mg. No attempt, however, had been made to classify the cases examined.

The first step in the study of the toxemias of pregnancy, begun by the authors about one year ago, was to determine whether a fairly large and representative group of toxic pregnant cases showed any characteristic pathologic variation in the chemical composition of the blood from that observed in normal, pregnant women. Our studies included an analysis of the blood, for nonprotein and urea nitrogen, uric acid, creatinine, sugar, chlorides and carbon dioxide combining power, and an examination of the urine for protein and casts. The methods employed in the analysis of the blood were carried out as outlined by Myers.[16] A notation of the systolic and diastolic blood pressures and some of the more salient clinical features was also made. Women who had been under observation during the whole period of their gestation were selected, after careful examination by obstetricians, to serve as normal cases. The blood was drawn according to the technic of Myers,[16] from the controls after a twelve hour fast, and in the pathologic cases at the height of the toxic state. In some instances another specimen for comparison was obtained after a distinct clinical improvement was evident. The data collected point to certain definite conclusions, which it seems pertinent to present at the present time. In this paper we propose to demonstrate that the toxemias of pregnancy coming under our observation may be grouped in two classes: (a) nephritic toxemias, (b) hepatic toxemias. These two types of toxemia present changes in the chemical composition of the blood that are definite and characteristic.

DISCUSSION OF DATA

The results of studies on 5 of the normal cases are presented in Table I. It will be observed that the nonprotein nitrogen here is at the low normal level or slightly decreased, (21 to 25 mg.) and corresponding to this there is a diminution in the concentration of the urea nitrogen (9 to 11 mg.). The urea nitrogen on the average forms 44 per cent of the nonprotein nitrogen. Our results in this particular, although at variance with the figures reported by Folin, are in conformity with those of Slemons and Morris, and in many instances with the findings of Caldwell and Lyle. The figures obtained for uric acid, creatinine and chlorides (of the whole blood) are well within normal limits. Normal blood sugar values were prevalent in all instances, with the exception of cases 1 and 2. Here slight hyperglycemias were noted. A definite decrease in the carbon

dioxide combining power of the blood plasma was found to be the rule in the last months of normal pregnancy. The maximum decrease was to 39 volumes per cent. This apparent drop in the reserve alkali of the blood although not accompanied by a ketonuria, was found to be associated with mild symptoms of dyspnea after physical exertion. It would appear from these findings and as well from the observations of Hasselbalch and Gammeltoft, of Losee and Van Slyke, and of White that a mild acidosis prevails during the last months of pregnancy. Finally, occasionally traces of protein were detectable in the urine. Casts, however, were never found.

Under the heading of nephritic toxemias we have grouped those cases that in their previous histories and in many of their clinical manifestations present definite evidence of a preexisting impairment of kidney function, either acute, or an exacerbation of a chronic condition. Here the renal insufficiency is not consequent to the pregnancy toxemia, but on the contrary it may have been a predisposing cause to the development of the toxemia. Of the 4 cases reported, the first 3 show an impairment of nitrogen elimination. It is obvious that the changes observed in blood of these cases are in accord with the variations typical of moderate or severe renal impairment in general. The nonprotein nitrogen was found to be greatly increased (45 to 106 mg.). A characteristic feature about these cases is that the urea nitrogen (51 to 67 per cent) constitutes a larger fraction of the nonprotein nitrogen than in normal blood. Such also is generally known to be the case in nonpregnant nephritics. Mosenthal and Hiller[17] have demonstrated that a selective action of the kidney maintains the urea nitrogen at a level of about 50 per cent of the total nonprotein nitrogen of the blood, but an impairment of renal function even of a slight degree may result in an increase in the percentage of the urea nitrogen. The retention of uric acid in the first case was very marked but only moderate in the third case, and the creatinine figures are but slightly above normal. Although these cases show a decrease in the carbon dioxide combining power of the blood plasma, the acidosis is not greater than in normal pregnancies.

Another type of toxemia of renal origin is represented by the fourth case. Here it will be observed that the nonprotein and urea nitrogen do not vary from the normal. The uric acid, however, is definitely increased (5.3 mg.). The chloride concentration of the whole blood was found to be 0.52 per cent. Myers and Short[18] have found the chlorides of the whole blood to range from 0.45 to 0.50 per cent in normal cases, whereas in parenchymatous nephritis with edema the chloride concentration is found to be from 0.52 to 0.60 per cent. The accumulated chlorides of the blood here, in spite of a salt-free diet, were coincident with a scanty output of urine containing a large amount of protein and a pronounced general anasarca which had

been progressing for four months previous to admission to the hospital. These findings indicate a definite impairment of chloride excretion, with but slight involvement of nitrogen elimination. This patient, although suffering from pronounced visual disturbances accompanied by headache and nausea, at no time had convulsions.

Hypertension was noted in all cases within this group and an examination of the fundi revealed the usual picture of albuminuric retinitis. Large amounts of protein and frequently casts had been observed in the urine for some time previous to coming under our observation. The first three cases developed severe convulsions, and in all cases there was but a slight general improvement following the termination of the pregnancy. It is evident, then, that in this type of toxemia, we are dealing with a more or less severe impairment of renal function, and the chemical changes observed in the blood must be attributed to this kidney insufficiency rather than to the pregnancy toxemia itself.

A study of the final 22 cases in the table, classified as hepatic toxemias, or true eclampsia, reveals an entirely distinct type of change in the composition of the blood. In general, the patients in this class are younger than those of the preceding group, and with 5 exceptions are primiparæ. In this regard it may be said also that the previous pregnancies of these multiparæ had been toxic, and were consequently prematurely terminated. Case 10 is, however, an exception. This patient had two living, healthy children. This group includes two cases of pernicious vomiting, and five of postpartum eclampsia.

Inspection of the table discloses that the nonprotein nitrogen is invariably above the high normal limit, and in some instances more than double that figure. The range of the values found is from 34 to 90 mg. On the other hand, the urea nitrogen in the first 19 cases is at the low normal level or markedly decreased, figures from 5 to 14 mg. being obtained. A remarkably low percentage of the nonprotein nitrogen is in the form of urea. The highest percentage found was 38 and the lowest 15. We believe that the high nonprotein nitrogen of which the urea nitrogen forms a small percentage is characteristic of pregnancy toxemias of the hepatic type, but at present we are not prepared to offer an explanation of this phenomenon. Although in the last three cases the urea nitrogen in the antepartum specimens is definitely increased above the normal, nevertheless the urea nitrogen constitutes a smaller fraction of the nonprotein nitrogen than in normal cases. These low percentages in the hepatic cases afford a striking contrast to the percentages obtained in the nephritic toxemias, although the figures for both the nonprotein and urea nitrogen are somewhat similar.

The increase in the concentration of uric acid (3 to 11 mg.) is very marked, and we are convinced, particularly significant. The results

obtained by Slemons and Bogert[19] are in accord with our findings. These authors, while reporting normal figures for uric acid in the blood in uncomplicated pregnancy, obtained values from 6 to 9 mg. in preeclampsia, eclampsia, and nephritis complicating pregnancy. Bauman, Hansman, Davis and Stevens[20] after a thorough study of renal function tests in a large series of cases, concluded that the uric acid concentration of the blood is the most delicate index of kidney function at our disposal. On numerous occasions, the fact has been established by Myers[21] and his coworkers that the normal uric acid concentration of the blood is 2 to 3 mg. and as the permeability of the kidney is lowered in the initial stages of renal impairment, this first becomes evident in the analysis of the blood, by high figures for uric acid. This retention of uric acid is a more reliable, and may be an earlier, indication of kidney involvement of the interstitial type than proteinuria or cylinduria. Later, as the condition progresses the urea accumulates, but as a rule there is no appreciable increase in the concentration of creatinine until the urea nitrogen has been doubled or more than doubled. The normal values for creatinine are from 1-2 mg., and a retention of creatinine above 3.5 mg. denotes a severe disturbance of kidney function. The order of retention of these nitrogenous wasted products is apparently dependent upon the ability of the kidney to excrete them. Myers and Fine[22] have shown that the normal kidney concentrates the creatinine 100 times, the urea 80 times, but the uric acid only 20 times. On reference to the table it will be evident that the high values for uric acid are accompanied by the occurrence of protein and casts in the urine. There can be no doubt but that this increase in the concentration of uric acid must be attributed to a mild impairment of renal function consequent to the toxemia. In the last two cases, the urea nitrogen has been increased to 22 mg. Folin states that the maximum concentration of urea nitrogen for strictly normal persons is 14 to 15 mg., and Kast and Wardell[23] after a careful study of the significance of the concentration of urea nitrogen in the blood in various conditions, conclude that values of 20 mg. or more have a pathologic significance. It is obvious then that the impairment of the functioning power of the kidneys has advanced in these two instances so far as not only to inhibit the excretion of uric acid, but as well of the urea. The observations on Case 20 are of interest in this connection. Here in the antepartum specimen of blood, obtained when convulsions lasting 3 to 4 minutes were rapidly succeeding one another, the nonprotein nitrogen was found to be 64 mg., the urea nitrogen 18 mg., the uric acid 7.5 mg., and the creatinine 1.7 mg., the urea nitrogen constituting only 28 per cent of the nonprotein nitrogen. The convulsions ceased after the evacuation of the uterus, but there was no other improvement. The patient continued in a semicomatose state, general edema developed

and there was but a slight drop in the blood pressure. Another specimen of blood was obtained 8 days after parturition when the patient appeared to be in a critical condition. There were, however, no convulsions. At this time, the nonprotein nitrogen had risen to 90 mg., the urea nitrogen to 43 mg., the uric acid had dropped to 3.2 mg., but the concentration of creatinine was increased to 3.7 mg. It is pertinent to note that in this second specimen of blood the urea nitrogen forms a much larger portion of the nonprotein nitrogen than in the antepartum specimen. Obviously the disturbance of kidney function which was indicated by the increased uric acid in the antepartum blood has progressed, despite the termination of the pregnancy, to such an extent that a marked retention of urea, and a mild accumulation of creatinine result. These findings confirm the observation of Ewing and Wolf that toxemia is a frequent cause of nephritis developing in pregnancy. Persistent toxemia tends to progressively involve the kidneys.

No variation from normal was noted in the concentration of creatinine except in the postpartum blood of Case 20. In some instances there was a very definite increase in the chlorides of the blood, and this increase was found to be associated with a more or less pronounced edema. In general it may be said that there is a mild hyperglycemia. Morris[24] has shown that a rise in the blood sugar is evident after convulsions in eclamptic toxemias. The slight increase in the blood sugar observed by us may be due to this factor, inasmuch as the specimens of blood were obtained at the height of the toxemia.

The decrease in the carbon dioxide combining power of the blood (42 to 12 volumes per cent) is particularly striking, indicating in most cases a severe acidosis. In this respect, the hepatic toxemias differ markedly from the nephritic toxemias. The rise in the carbon dioxide combining power in the second specimen of Case 20 is due to alkali therapy. Where surgical interference is contemplated, measures to relieve this acidosis are of prime importance. Among the cases recorded, there have been three deaths due in all probability to postoperative acidosis.

With the exception of the two cases of pernicious vomiting, a hypertension is generally noted. The chemical changes, however, found in pernicious vomiting are analogous to those in postpartum eclampsia, and eclampsia with gravid uterus. These findings are of interest in view of the statement of Ewing[25] that pernicious vomiting and eclampsia are identical in nature and have the same etiology. A general clinical improvement appears to be consequent to a resumption of the normal composition of the blood. In Case 9 the toxic symptoms disappeared 5 days after delivery, and at this time the blood was found to be normal. But it was only after a period of fourteen days that Case 6

presented evidence of improvement. The fundi in all cases examined proved to be normal.

Fig. 1 presents graphically the average values for nonprotein and urea nitrogen and uric acid in cases of normal pregnancy, chronic nephritis, nephritic toxemias and hepatic toxemias. It will be noted that in the nephritic toxemias the relation of the urea nitrogen to the nonprotein is analogous to that characteristic of chronic nephritis,
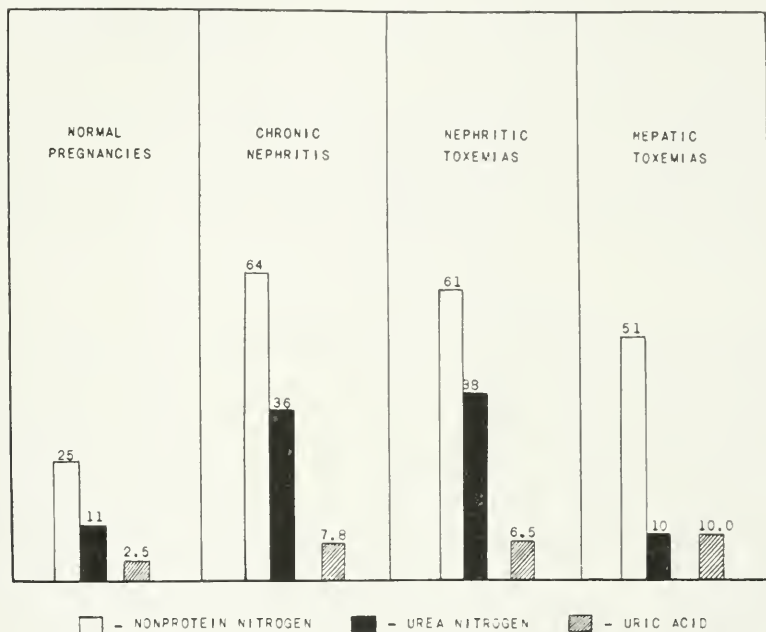

Fig. 1.—Diagrammatic illustration showing blood findings in pregnancy.

but in the hepatic toxemias the disturbance of this relation is very striking. It will also be observed that the average value for uric acid in the hepatic toxemias is greater than in chronic nephritis or the nephritic toxemias.

CONCLUSIONS

1. Low values for nonprotein and urea nitrogen are found in normal pregnancy. The urea nitrogen constitutes about 44 per cent of the nonprotein nitrogen. No variation is found in the uric acid, creatinine, chloride or sugar concentration of the blood of normal pregnant women from that observed in nonpregnant women. A slight decrease in the carbon dioxide combining power of the blood plasma characterizes the last months of normal pregnancy.

2. The chemical changes in the blood in the nephritic toxemias are typical of impairment of kidney function in general. There is an increase in nonprotein and urea nitrogen, and more than 50 per cent

of the nonprotein nitrogen is in the form of urea nitrogen. Some of the clinical symptoms, also point to a more or less severe nephritis. At most but a slight improvement follows the emptying of the uterus.

3. Analogous chemical changes are found in the blood in pernicious vomiting, postpartum eclampsia, and eclampsia with gravid uterus. The nonprotein nitrogen is markedly increased, whereas the urea nitrogen is at the low normal limit or decreased, constituting 15 to 38 per cent of the nonprotein nitrogen. A definite increase in uric acid is found, which is due to an impairment of renal function. In some cases the disturbance of the kidney function resulted in a retention of urea nitrogen in addition to the uric acid. In this type of toxemia the involvement of renal function results from the toxemia. A moderate or severe acidosis is observed in all cases. A prompt improvement, judged from a clinical standpoint and from the chemical composition of the blood in most instances follows the evacuation of the uterus.

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THE BLOOD CHEMISTRY IN NORMAL AND ABNORMAL PREGNANCY*

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To THOSE interested in investigating eclampsia and its allied disturbances a new approach has been opened by the recent advent of microchemical methods for the determination of the several nonprotein nitrogen constituents of the blood. In this paper we present for consideration the results obtained from a chemical analysis for these constituents as they are found, first, in normal pregnancy and then in toxemias of pregnancy and in eclampsia.

In the normal cases the blood specimens were obtained from the antepartum clinic of the New York Nursery and Child's Hospital. The blood of the cases of eclampsia and toxemia came from the maternity service of Bellevue Hospital. The chemical analyses were carried out at the Harriman Research Laboratory by chemists who have been using practically the same technic since 1916.†

The figures in our tables represent milligrams per hundred cubic centimeters of blood.

As a result of more than 5000 chemical examinations, the Harriman Research Laboratory has come to regard the following nitrogen partition (mg. per hundred c.c. of blood) as a normal blood picture in a healthy nonpregnant woman:

N.P.N.	UREA N.	CREATININ	URIC ACID	U.N. TO N.P.N.
35 mg.	18 mg.	2 mg.	3 mg.	50 per cent
or less	or less	or less	or less	

These figures correspond with the standards generally accepted by other investigators.

In Tables I, II and III are given the blood pictures of 150 pregnant women, all of whom were clinically free of disease, with negative Wassermann reactions. The systolic blood pressures were under 130 mm. of mercury. The urines were free from albumin and casts. They all went through a normal labor and puerperium.

TABLE I

NORMAL PREGNANCY

Case	Month	BLOOD ANALYSIS MG. PER 100 C. C.				RATIO: U. NIT. TO N. P. N.	Case	Month	BLOOD ANALYSIS MG. PER 100 C. C.				RATIO: U. NIT. TO N. P. N.
		N. P. N.	UREA NITR.	CREAT-ININ	URIC ACID				N. P. N.	UREA NITR.	CREAT-ININ	URIC ACID	
1	1		9.40	1.20	0.80		29	6	30.20	12.30	1.10	2.47	0.41
2	2	34.60	15.90	1.30		0.46	30	6	33.10	14.40	0.74	0.68	0.44
3	2	37.40	18.10	1.10	1.86	0.48	31	6	31.50	10.10	1.25	0.82	0.32
4	2	33.60	15.40	0.93	2.11	0.46	32	6	30.20	7.25	0.79	2.40	0.24
5	3	37.40	12.30	0.91	0.80	0.33	33	6	31.00	12.20	1.00		0.39
6	3	20.20	8.10	1.20	0.82	0.40	34	6	27.40	7.92		1.30	0.29
7	4	36.00	14.50	1.10	1.30	0.40	35	6	21.00	10.20	0.73	1.00	0.49
8	4	26.60	11.50	1.10	1.74	0.43	36	6	21.00	10.00	0.92		0.48
9	4	27.00	10.90	1.20	2.00	0.40	37	6	31.00	10.10	0.67	0.79	0.33
10	5	35.70	11.80	1.40	3.50	0.33	38	6	28.00	11.50	1.00	2.00	0.41
11	5	38.20	18.70			0.49	39	6	29.50	12.90	1.40	0.95	0.44
12	5	30.20	11.50	1.10	0.80	0.38	40	6	31.70	11.90	1.20	1.30	0.38
13	5	27.00	3.60	1.00	1.72	0.13	41	6	32.30	13.30	1.50	2.66	0.41
14	5	23.00	10.80			0.47	42	6	33.10	18.00	1.10	2.18	0.54
15	5	23.50	9.35	0.98	1.18	0.40	43	6	26.00	12.20	1.07	1.70	0.47
16	5	27.00	12.90	1.10	1.34	0.48	44	6	18.00	7.90	0.69		0.44
17	5	25.30	8.10	1.10	1.89	0.32	45	6	24.50	10.10			0.41
18	6	29.00	10.80	1.05	0.88	0.37	46	6	31.00	13.20	1.20	0.68	0.43
19	6	30.20	11.30	1.87	1.08	0.37	47	6	26.90	12.20	0.81	2.70	0.45
20	6	31.50	7,21	0.82	0.57	0.23	48	6	27.00	11.70	1.00	2.13	0.43
21	6	31.60	7.92	0.87		0.25	49	6	28.50	12.40	0.71	2.88	0.44
22	6	26.60	6.13	0.87	0.82	0.23	50	6	26.90	11.00	1.00	1.62	0.41
23	6	29.50	7.70	0.91	1.68	0.26	51	6	26.40	10.60	0.90	2.41	0.40
24	6	24.50	5.75	0.98	1.00	0.24	52	6	31.00	13.70	0.67	2.37	0.44
25	6	26.60	11.00	0.88	1.26	0.41	53	6	31.20	13.50	1.10	1.00	0.43
26	6	38.20	12.00	1.50	0.99	0.31	54	6	27.80	12.40	0.98	1.30	0.45
27	6	24.50	9.40	0.95	2.10	0.38	55	6	29.60	10.70	0.57	0.95	0.36
28	6	36.00	10.50	1.10	1.00	0.29							
							Ave.		29.19	11.21	1.04	1.53	0.39

TABLE II

NORMAL PREGNANCY

Case	Month	BLOOD ANALYSIS MG. PER 100 C. C.				RATIO: U. NIT. TO N. P. N.	Case	Month	BLOOD ANALYSIS MG. PER 100 C. C.				RATIO: U. NIT. TO N. P. N.
		N. P. N.	UREA NITR.	CREAT-ININ	URIC ACID				N. P. N.	UREA NITR.	CREAT-ININ	URIC ACID	
1	7	26.70	12.20	1.50	2.50	0.46	27	7	29.50	9.00	1.30	2.24	0.31
2	7	29.00	11.50	0.80		0.40	28	7	41.63	5.05			0.12
3	7	23.00	10.10	0.79	0.45	0.44	29	7	28.10	8.09	0.89		0.29
4	7	36.00	14.60	1.00	2.10	0.41	30	7	39.50	9.72	0.97	0.95	0.25
5	7	23.70	8.50	2.80	3.00	0.36	31	7	29.20	12.90	0.87	1.14	0.44
6	7	27.40	9.80	1.20	2.10	0.36	32	7	31.30	17.62	1.04	1.44	0.56
7	7	24.50	10.80	0.69		0.44	33	7	32.40	10.01	1.07	3.14	0.31
8	7	33.20	13.70	1.10	1.20	0.41	34	7	35.20	9.00	0.97	0.91	0.25
9	7	36.00	19.60	0.80		0.54	35	7	27.40	16.20	1.02		0.59
10	7	33.10	14.40	2.00	2.94	0.44	36	7	31.70	9.20	0.92	2.29	0.29
11	7	28.80	10.80	1.10	2.60	0.38	37	7	32.00	18.39	0.75	1.47	0.58
12	7	33.80	10.00	1.00	0.99	0.30	38	7	23.00	12.90	0.75	1.10	0.56
13	7	33.80	14.90	1.00	2.00	0.44	39	7	28.80	12.90	1.10	1.00	0.45
14	7	21.60	9.20	1.20		0.43	40	7	38.50	11.20	0.86	1.02	0.29
15	7	28.80	10.10	0.75		0.35	41	7	23.80	7.94	0.86	0.50	0.33
16	7	29.50	12.60	1.05	1.98	0.43	42	7	27.00	10.20	1.20	4.00	0.38
17	7	20.10	10.80	0.59		0.54	43	7	24.80	7.90	0.74	1.93	0.32
18	7	26.60	11.50	1.07	1.70	0.43	44	7	26.00	9.00	0.62	1.89	0.35
19	7	31.70	10.10	1.00		0.32	45	7	32.40	11.18	0.87	0.95	0.35
20	7	20.80	8.70	1.30	2.44	0.42	46	7	23.40	6.45	0.73	2.76	0.28
21	7	28.80	8.65	0.87	0.94	0.30	47	7	30.20	9.70	1.25	1.17	0.32
22	7	33.80	11.50	1.10	1.04	0.34	48	7	27.30	11.70	0.88	1.87	0.43
23	7	26.70	11.20	0.77	0.74	0.42	49	7	26.90	12.20	0.81	2.70	0.45
24	7	30.20	12.00	1.16	2.22	0.40	50	7	27.90	12.40	0.98	1.90	0.44
25	7	28.10	11.50	0.89	1.11	0.41	51	7	34.10	15.90	0.71	2.14	0.47
26	7	27.70	15.10	1.30	2.88	0.55							
							Ave.		29.23	11.31	1.03	1.78	0.39

TABLE III

NORMAL PREGNANCY

Case	Month	BLOOD ANALYSIS MG. PER 100 C. C.				RATIO: U. NIT. TO N. P. N.	Case	Month	BLOOD ANALYSIS MG. PER 100 C. C.				RATIO: U. NIT. TO N. P. N.
		N. P. N.	UREA NITR.	CREATININ	URIC ACID				N. P. N.	UREA NITR.	CREATININ	URIC ACID	
1	8	26.00	10.00	1.30	1.90	0.39	23	8	32.40	12.95	0.85	3.33	0.10
2	8	27.40	13.90	1.30	2.00	0.51	24	8	29.60	10.10	0.84	2.53	0.34
3	8	33.00	13.70	1.40		0.42	25	8	28.00	10.40	0.89	0.84	0.37
4	8	25.10	9.70	1.10	3.20	0.39	26	8	30.20	12.40	0.98	2.87	0.41
5	8	31.70	14.40	1.35	2.32	0.45	27	8	36.40	14.40	0.84	1.15	0.40
6	8	30.28	8.64	1.50		0.29	28	8	29.20	11.15	1.08	2.37	0.38
7	8	33.20	13.70	1.30	3.48	0.41	29	8	33.10	7.70	1.10	0.54	0.23
8	8	21.60	10.00	1.60	3.30	0.46	30	8	27.00	12.60	1.30	1.24	0.47
9	8	31.00	12.20	1.00		0.39	31	8	27.40	11.70	1.10	1.90	0.43
10	8	29.50	14.40	1.10		0.49	32	8	27.50	11.00	1.20	1.60	0.40
11	8	29.50	12.90	1.20		0.44	33	9	27.00	4.70	0.85		0.17
12	8	34.20	11.50		1.33	0.34	34	9	28.10	9.20	0.60		0.33
13	8	32.10	13.80	0.99	1.00	0.43	35	9	34.50	11.50	0.80	1.20	0.33
14	8		12.96	0.75	1.00		36	9	31.00		1.40	1.90	
15	8	31.70	15.10	1.30	2.70	0.48	37	9	38.10	9.40	0.77		0.25
16	8	33.60	17.30	1.20	2.60	0.51	38	9	34.50	11.00	1.30	2.10	0.32
17	8	42.50	15.30	1.30	1.10	0.36	39	9	21.70	10.70	1.10	3.10	0.49
18	8	28.00	11.50	0.86	1.00	0.41	40	9	39.00	14.40	1.50	1.30	0.37
19	8	29.50		0.89	2.42		41	9	41.80	21.60	0.98	2.50	0.52
20	8	25.90	9.90		0.93	0.38	42	9	38.20	21.60			0.57
21	8	30.20	7.20	1.10	2.30	0.24	43	9	26.70	8.70	1.20	2.84	0.33
22	8	24.80	8.65	0.82	0.50	0.35	44	9	35.60	16.20	1.10		0.45
Ave.8		30.05	11.97	1.11	1.91	0.40	Ave.9		33.02	12.64	1.05	2.13	0.38

The averages of the several nitrogen partitions for the entire series were as follows:

N.P.N.	UREA N.	CREATININ	URIC ACID	U.N. TO N.P.N.
29.69	11.51	1.05	1.73	39 per cent

A grouping of our cases according to the period of pregnancy disclosed no significant differences between the successive periods; although the twelve cases grouped in the ninth month show a slightly higher average for N.P.N., urea N. and uric acid.

Hitherto, the largest series of chemical analyses of blood taken during a normal pregnancy is reported by Folin[1] and comprise one hundred cases. This investigator, while not giving the figures for the individual determinations, states that the total N.P.N. in the great majority of his cases was under 30 mg.; and the urea nitrogen, 5 to 9 mg. Most other investigators have found slightly higher limits for urea nitrogen. In other respects it has been shown that the blood picture in normal pregnancy does not vary definitely from that of the non-pregnant individual. We refer especially to the reports of Farr and Williams,[2] Slemons and Morris,[3] Slemons and Bogert[4] and Losee.[5] The amino-nitrogen content of the blood has been studied by Morse,[6] Losee and Van Slyke[7] and others, who have found that the level of this nitrogen remains undisturbed by pregnancy.

In the 150 cases of this series the average ratio between urea N. and N.P.N. is 39 per cent. This is higher than that found by Folin (20 to 35 per cent); but it is lower than that reported by some other in-

vestigators. Compared with the blood of normal nonpregnant women, the urea N., in pregnancy, is maintained at a definitely lower level. Murlin and Bailey,[5] Wilson[6] and others, in their studies of the metabolism of pregnancy, have found both in women and in animals, a distinct nitrogen retention, especially in the latter weeks of pregnancy. Assuming the nitrogen retention to be at the expense of urea nitrogen, we can understand a lowered urea excretion. But this should in no way affect the blood-urea level; since this level we understand, is regulated by the threshold of permeability of the kidneys. The diminished ratio of the urea N. to the total N.P.N. increases the undetermined nitrogen factor. This offers an interesting field of speculation to students of protein metabolism. Unfortunately, in this series, we did not determine aminonitrogens routinely. In the few cases examined, however, our figures correspond with those of Morse,[6] Van Slyke and Losee.[7] Our failure to make these examinations regularly, deprives us of essential data for estimating the undetermined nitrogen.

Next in interest to the ratio of urea N. to N.P.N. is perhaps the comparison of the maternal and the fetal bloods at the end of labor. We have found (as given in Table IV) the N.P.N., urea N., creatinine and uric acid in the two circulations at the end of labor practically identical. For N.P.N. and urea N. this result is confirmed by Slemons and Morris;[3] for uric acid by Slemons and Bogert;[4] for creatinine by Plass.[10] Manifestly, for these substances, the placental interchange represents a simple process of diffusion. For the aminonitrogens, however, both Morse[6] and Rabinovitch[11] have found a definite increase in the fetal over the maternal blood content; although Morel and Mauriquand[12] in four analyses found no such difference. If this increase be accepted, it might be explained as a provision for protecting the fetus from nitrogen starvation. Such a theory, however, carries with it the assumption of absorptive properties on the part of the placenta; and also exempts the aminonitrogens from the operation of the diffusion principle applicable to the other nitrogenous constituents.

Table IV further shows that in cases of normal pregnancy the nitrogen partitions of maternal blood at the end of labor do not differ materially from those found during the latter weeks of pregnancy. Neither does any significant difference appear in cases of primiparæ and multiparæ. Our high uric acids occur with definite complications; or at least with clinical deviations from the normal, namely, increased blood pressure, albuminuria or multiple births. Slemons and Bogert[4] found a marked increase in uric acid in primiparae, in one instance this purin reaching as high as 8 mg. per hundred c.c. We cannot accept their suggestion that the increase may be the effect of the muscular effort of labor; we must rather regard this retention as due to the renal insufficiency that frequently develops in the latter weeks of pregnancy

TABLE IV

BLOOD PICTURES AT END OF NORMAL LABOR

CASE	PARITY	N. P. N.	UREA N.	CREAT.	URIC A.	SUGAR	U. N. TO N. P. N.	B. P.	URINE
1	P.	26.5	11.7	0.90	2.78	0.11	0.44	120/80	Neg.
2	P.	33.4	15.7	0.70	3.37	0.10	0.47	125/80	Neg.
	Fetus	N. B.*	N. B.*	0.64	3.51	0.082	. . . . . .	. . . . . .	. . . .
3	P.	28.9	13.8	0.70	4.44	0.085	0.48	120/80	Neg.
	Fetus	29.1	13.8	0.67	N. B.	0.087	. . . . . .	. . . . . .	. . . .
4	P.	21.9	7.0	0.91	2.15	0.087	0.32	120/88	Neg.
5	P.	27.0	11.6	1.40	2.85	0.11	0.43	110/60	Trace Alb.
6	P.	25.3	9.0	0.95	4.28	0.080	0.36	140/90	Neg.
7	P.	25.0	8.3	1.10	3.42	0.10	0.33	150/100	Trace Alb.
	Fetus	25.0	8.3	1.10	3.08	0.10	. . . . . .	. . . . . .	. . . .
8	P.	26.9	11.0	1.40	1.92	0.10	0.11	Under 120-syst.	Neg.
	Fetus	27.0	11.0	1.40	1.90	0.10	. . . . . .		. . . . . .
9	P.	26.4	9.68	1.30	1.10	0.10	0.37	Under 120-syst.	Neg.
	Fetus	26.0	9.7	1.35	1.50	0.10	. . . . . .		. . . . . .
10	P.	25.9	10.3	1.00	2.27	0.10	0.40	Under 120-syst.	Neg.
	Fetus	25.5	10.3	1.00	2.30	0.09	. . . . . .		. . . .
Ave.	P.	26.72	10.81	1.03	2.89	. . . . . .	. . . . . .	. . . . . .	. . . .
11	M.	36.9	19.1	1.30	3.02	0.12	0.52	. . . . . .	. . . .
12	M.	23.1	9.0	0.66	3.20	0.073	0.39	. . . . . .	. . . .
13	M.	26.1	12.4	0.90	2.22	0.69	0.47	120/90	Neg.
14	M.	22.4	6.9	0.59	. . . . . .	0.082	0.31	120/90	Neg.
15	M.	. . . . . .	9.2	. . . . . .	3.00	. . . . . .	. . . . . .	122/90	Neg.
	Fetus	. . . . . .	9.2	. . . . . .	. . . . . .	. . . . . .			. . . . . .
16	M.	53.0	24.8	1.40	5.86	0.11	0.47	140/90	Neg.
	Fetus	. . . . . .	26.0	. . . . . .	5.86	. . . . . .	. . .	. . . . . .	Twins
17	M.	27.0	11.5	1.30	2.41	0.091	0.43	138/85	Trace Alb.
18	M.	23.9	7.6	1.30	2.14	0.09	0.31	110/50	Neg.
	Fetus	24.0	7.6	1.30	2.20	0.095	. . . . . .		. . . . . .
19	M.	25.8	9.0	1.40	2.04	0.10	0.35	Under 120-syst.	Neg.
	Fetus	25.1	9.0	1.53	2.15	0.089	. . . . . .		. . . . . .
20	M.	26.0	10.3	2.00	1.80	0.09	0.40	Under 120-syst.	Neg.
	Fetus	26.0	10.3	1.90	1.65	0.09	. . . . . .		. . .
Ave.	M.	29.4	11.9	1.21	2.85	. . . . . .	. . . . . .	. . . .	. . . .

*N. B. = No blood for analysis.

or during long labor. It has been established that muscular activity cannot increase the production of endogenous uric acid.

The high uric acid retention frequently found at the end of labor may account in part for the high uric acid content found by Kingsbury and Sedgwick[13] in the newborn; although in the newborn one must consider the additional uric acid derived from the nucleated red cells which suffer a rapid destruction soon after birth.

TOXEMIA AND ECLAMPSIA TABLES V, VI AND VII

Both from the clinical course of the disease and from autopsy findings, we know that eclampsia and toxemia are always accompanied

TABLE V

ECLAMPSIA

BLOOD SPECIMENS ANTE- AND POSTPARTUM

CASE	PERIOD	PARITY	CLINICAL NOTES	DATE EMPTYING UTERUS	DATE BLOOD SPECIMEN	N. P. N.	UREA NITR.	CREAT-ININ	URIC ACID	ALBUMIN	CASTS	FOLLOW UP NOTES
1	9 Mos.	P.	Admitted 7-8-18. For two weeks before admission, persistent headache, edema and vomiting. Admitted in labor and having convulsions; delivered same day, 7-8-18. B. P. on admission 155/115. B. P. on discharge 120/65. First blood taken intrapartum.	7-8-18	7- 8-18 7- 9-18 7-12-18	44.00 50.50 21.00	17.30 23.10 11.50	.5.40 3.80	5.00 7.20 6.60	2 +	Many	Seen 12-28-20. Mother in good condition. B. P. 120/70. Urine negative. Second confinement 7-19-20, perfectly normal. Both babies alive and well.
2	7½ Mos.	M.	Admitted 8-2-19 in labor having developed severe headache and nausea 24 hours previously; followed by two convulsions at home. Thirteen convulsions after admission. Version and breech extraction, live child. Edema and headache for one month previous to admission. B. P. on admission 160/110; on discharge 120/80.	8-3-19	8- 3-19 8- 5-19 9/15-19	35.30 35.00 45.50	15.70 14.40	3.10 3.10 0.97	5.10 5.00	4 +	Many	Seen 12-30-20. Highly nervous. B. P. 118/68. Urine negative. Induced abortion 1-19-20. Baby well.
3	8 Mos.	M.	Admitted 11-27-18 with convulsions; temperature 103, with pulmonary signs. Labor induced; 12 convulsions; stillborn child 5½ hours later. Patient died twenty minutes later in coma. Temperature 104. B. P. 145/100 on admission, followed by 175/105.	11-28-18	11-28-18	57.00	32.10	1.85	3.50	4 + Solid	Many	Patient died 11-28-18.
4	6 Mos.	P.	Admitted 2-17-19 having had headache, edema and visual disturbance for two weeks before admission. Labor induced; 6-months' stillbirth 2-20-19, followed immediately by seven convulsions. Developed jaundice; bronchopneumonia. Died 2-25-19. B. P. on admission 145/100.	2-20-19	2-18-19	51.70	25.20	1.10	4.00	2-17-19 4 + 2-25-19 Solid	Many Many	Patient died 2-25-19.

TABLE V—(CONTINUED)

No.	Gest.	Sex	Clinical Notes	Delivery	Date	I	II	III	IV	Albumin	Casts	Remarks
5	8 Mos.	M.	Admitted 1-3-19. Was said to have had a convulsion before admission. Labor induced; delivered of a premature live child 1-5-19. Three convulsions intrapartum; none afterwards. Onset apparently sudden. B. P. on admission 174 108; 1-7-19, 160 100.	1-5-19	1-4-19 1-5-19 1-10-19 1-15-19 / 11-29-20	31.00 31.60 30.40 / 34.00	10.80 10.95 10.60 / 17.20	1.30 1.20 1.00 / 0.96	4.80 4.80 3.40 3.05 / 1.76	1+	Many	Seen 11-29-20; B. P., 128 70; urine negative Subsequent pregnancy perfectly normal in 1920. Premature child died.
6	7½ Mos.	P.	Admitted 4-3-18. Sudden onset previous day with severe epigastric pain, edema and convulsions. 4-3-18 bag inserted, temperature 103, and pulmonary signs; bag removed 4-5-18, patient died undelivered. B. P. 205 120 before death.	Undelivered	4-3-18	43.5	19.45	0.98	1.58	Solid	Many	Patient died 4-6-18.
7	7½ Mos.	P.	Admitted 6-28-18. Convulsions and coma 6-29-18. Labor induced. Six convulsions intrapartum. Spontaneous delivery 7-1-18. B. P. on admission, 150 120; normal on discharge 7-11-18.	7-1-18	6-30-18 1-17-21	50.50 32.50	32.40 15.10	1.30 1.00	10.00 3.28	6-30-18 4+ 7-8-18 1.8%	Many Few	Seen 12-30-20. Mother and baby well. B. P., 120 65 Urine negative.
8	8 Mos.	P.	Admitted 5-28-18 in coma, having had one convulsion; induced labor; spontaneous delivery; 5-hour labor. Two convulsions antepartum; three intrapartum and seven postpartum. Since 4th month, has had headache and edema. B. P., 160 100 on admission. On discharge 6-13-18. B. P. normal; trace of albumin.	5-29-18	5-30-18 6-3-18 6-7-18	51.20 44.10 41.10	25.20 21.00 21.10	2.88 2.00 1.79	6.76 5.60 2.50	5-28-18 1+ 6-4-18 Negative	Many Few	Seen 12-30-20. Mother in good condition. Baby well. Second confinement July, 1920, normal. Both babies well. Urine negative. B. P. 120 80.
9	7½ Mos.	P.	Admitted 3-11-18, having had a convulsion 12 hours previously. Labor immediately induced. Delivered of dead fetus in 9 hours. Nineteen convulsions between admission and delivery. Fourth day postpartum, developed a psychosis. Transferred to Insane Asylum.	3-11-18	3-11-18 3-15-18	58.5 47.5	34.5 18.0	1.06 0.96	5.85 3.10	1+ 2+	2+	Recovered, but insane.
10	7½ Mos.	P.	Admitted 6-25-18 in labor, having had headache and swelling of ankles. For past month has had a history of having had a convulsion two weeks before admission. Spontaneous delivery, live child. Died in 21 hours. B. P. 240 170.	6-27-18	6-25-18 6-26-18	41.8 45.5 52.6	17.3 21.3 18.7	1.5 1.4 1.8	6.4 6.4 6.6	3+	Many	Could not be traced in January, 1921.

TABLE V.—Continued

ECLAMPSIA

BLOOD SPECIMENS ANTE AND POSTPARTUM

CASE	PERIOD	PARITY	CLINICAL NOTES	DATE EMPTYING UTERUS	DATE BLOOD SPECIMEN	BLOOD ANALYSIS				URINE		FOLLOW UP NOTES
						N. P. N.	UREA NITR.	CREATININ	URIC ACID	ALBUMIN	CASTS	
11	9 Mos.	P.	Admitted 6-17-18 in labor, fully dilated and having had five convulsions before admission; breech extraction. Died 2½ hours later after four more convulsions. B. P. 180/100.	6-17-18	6-17-18	39.6	20.5	3.5	8.3	1+	Many	Patient died 6-17-18.
12	9 Mos.	P.	Admitted 1-23-18 with convulsions and in labor; onset sudden; delivered 4-24-18 by forceps. Mother and baby discharged in good condition 5-18-18. B. P. on admission 150/115; on discharge 126/105.	4-24-18	1-23-18, 4-25-18, 1-30-18	49.6, 41.7, 47.0	22.62, 19.10, 15.12	1.33, 1.30	1.10, Trace	1+	Many	Seen 1-7-21, urine normal; B. P. 120/78, normal pregnancy. Both children well.
13	8 Mos.	M.	Admitted 5-17-18 in coma, convulsions, and with marked edema. B. P. 190/110. Delivered by caesarean 5-18-18. 56 convulsions in hospital.	5-18-18	5-17-18, 5-29-18	10.00, 51.00	11.40, 21.5	0.95, 0.91	7.40, 2.15	4+	2+	Recovered. Doctor reports mother and baby in good condition.
14	9 Mos.	P.	Admitted 3-19-18, with convulsions and a history of having had visual disturbance and edema for two weeks. Bag inserted, delivered the same day of stillbirth; 4 convulsions. B. P. on admission 174/78; on discharge 128/86.	3-19-18	3-19-18, 3-21-18, 3-25-18	52.1, 52.2, 39.0	25.56, 21.90, 15.1	1.21, 1.23, 0.95	6.13, 5.0, 2.81	4+	Many	Seen 11-20-20. Patient in good condition; B. P. 139/70; urine negative. Fifteen months after leaving hospital had a caesarean section for placenta previa; live baby. No signs of toxemia in 2d preg.
15	6 Mos.	P.	Admitted 5-18-19 in labor, having had one convulsion and giving a history of edema, headache, visual and gastric disturbances for previous six weeks. B. P. 156/90; four convulsions intrapartum. Patient discharged in good condition 5-31-19.	5-19-19	5-19-19, 5-23-19, 6-2-19, 1-5-21	62.50, 36.90, 37.40, 33.00	23.70, 18.7, 18.7, 15.90	1.00, 0.86, 1.30, 0.96	9.14, 1.90, 2.00, 2.92	4+	Many	Seen 12-30-20. Another pregnancy terminated 6-19-20, full term, normal child. Had some edema and headache during this pregnancy. B. P. 135/90; urine shows trace of albumin; frequent headaches.

Table V—Continued

| 16 | 9 Mos. | M. | Admitted 6-15-18 and delivered after a spontaneous labor 7-5-18 of normal child. Only four convulsions after delivery. Gives a history of epilepsy in childhood. In a previous pregnancy had convulsions. Has had frequent convulsions throughout this pregnancy and for last two days, convulsions have become almost constant. B. P. 141/98 on admission; on discharge 120/80, 7-16-18. | 7-5-18 | 6-19-18 6-21-18 | 38.20 29.60 | 21.60 11.50 | 1.43 1.32 | 7.10 6.80 | 1 + | Many | Seen 1-7-21. Patient had subsequent pregnancy ending 10-16-19; went to term but had convulsions throughout pregnancy; again showed increased B. P. and large amount of albumin. Labor induced; child died. Seen 1-5-21; evidently an epileptic with added toxemia during pregnancies. B. P. 115/65. Albumin—trace. Very bad teeth. |
| | | | | | 1-7-21 | 29.01 | 13.8 | 0.96 | 1.72 | | | |

TABLE VI

ECLAMPSIA

BLOOD SPECIMENS POSTPARTUM

CASE	PERIOD	PARITY	CLINICAL NOTES	DATE EMPTYING UTERUS	DATE BLOOD SPECIMEN	BLOOD ANALYSIS				URINE		FOLLOW UP NOTES
						N. P. N.	UREA NITR.	CREAT-ININ	URIC ACID	ALBUMIN	CASTS	
1	5 Mos.	P.	Admitted 6-8-18 having convulsions and in labor; immediately delivered. Headache, nervousness, and some edema for the two weeks preceding. B. P. 6-8-18, P. P. 125/80; on discharge 6-13-18, B. P., 112/60.	6- 8-18	6-10-18	44.00	30.00	1.80	6.50	4 +	Many	Seen 12-20-20. Second confinement Nov., 1919. Normal birth; mother and baby well. B. P. 130/90; urine neg.
					1- 5-21	29.90	14.50	1.00	2.13			
2	6½ Mos.	M.	Admitted 2-17-18 immediately after delivery, having convulsions, in a state of coma, and with suppression of urine. Died next day. B. P. 200/140.	2-17-18	2-18-18	83.6	63.8	4.0	7.6	3 +	Many	Patient died 2-18-18. POST MORTEM FINDINGS. Pyelonephritis with ureteritis, right; and cystitis. Acute parenchymatous degeneration of left kidney (with infarction). Acute hepatitis (with infarction). Lobular pneumonia (aspiration) with acute pulmonary congestion. Acute bronchitis. Acute hemorrhagic myocarditis. Acute aortitis. Acute splenitis. Accessory spleen. Puerperal uterus. Congestion of viscera.
3	9 Mos.	P.	Admitted 3-9-18 having had a convulsion 15 minutes before. No edema, no dyspnea. B. P. 150/95. Three convulsions in next two hours. Delivered by abdominal cesarean. Living child. Three convulsions in next 12 hours. No further convulsions. Normal B. P. 122/80 on discharge.	3- 9-18	3-13-18	29.2	10.8	0.99	2.5	1 +	Few	Mother and child well in 1921.

TABLE VI—Continued

No.		Mos.	History											Remarks

4 | P. | 9 Mos. | Admitted 7-30-18. Headache and edema for previous two weeks. On July 30, delivered normally of twins. Four hours later, convulsions began; seven in next 24 hours. B. P. 140/95; on discharge 8-5-18, 120/80. | 7-30-18 | 7-31-18 8-1-18 8-7-18 | .... 34.0 | 23.6 23.8 19.4 | .... 1.5 | 12.9 9.5 2.0 | 7-31-18 Boiled Solid. 8-3-18 1+ 8-5-18 1+ | Many Few None | Seen 12-3-20. One twin died when six weeks old. Second confinement June 1920. Mother and children well.

5 | P. | 9 Mos. | Admitted 9-1-19 in labor, while being delivered had a convulsion, followed by semicoma. Delivered normally of a live child. Had six convulsions during the day. B. P. on admission 156/90; on discharge 128/86. | 9- 1-19 | 9- 3-19 | 28.00 | 12.20 | 0.71 | 1.30 | | None | Seen 12-18-20. Baby well. Patient four months' pregnant. Well.

6 | P. | 9 Mos. | Admitted 9-3-18. For past three days, headache, edema, and disturbed vision. Admitted with cervix fully dilated and marked edema. Severe eclamptic convulsion; no recurrence. Had severe postpartum hemorrhage. Delivered of full term live child. B. P. on admission 150/110; on discharge 122/90. | 9- 3-18 | 9- 1-18 | 31.6 | 13.6 | 2.4 | 3.0 | 9- 4-18 2+ 9- 5-18 2+ 9- 7-18 1+ | Few Few None | Seen 12-30-20. Baby well. Mother at Sea View Hospital; tuberculosis.

7 | M. | 9 Mos. | Admitted 8-17-19 having been normally delivered at home 8-15-19 and having developed convulsions 30 hours after delivery. 12 convulsions in hospital. Gave history of headache and edema for six weeks prior to delivery. B. P. on admission, 172/120; on discharge 122/80. | 8-15-19 | 8-20-19 1- 3-21 | 47.70 33.90 | 22.80 16.50 | 1.45 1.10 | 4.7 3.21 | On adm. 4+ On dis. 1+ | Many Few | Seen 11-20-20. No subsequent pregnancy. Baby well. Mother suffers from severe headaches. B. P. 122/80. Urine neg. Seen 1-16-21. Still has headaches. B. P. 118.70. Urine neg.

8 | M. | 9 Mos. | Admitted 3-1-18. In latter half of pregnancy complained of severe frontal headache, swelling of face and legs, and visual disturbances. Normal labor, stillbirth, 2-19-18. Convulsions suddenly 3-1-18. 32 convulsions in next 24 hours. B. P. on admission 156/98; on discharge 120/80. | 2-19-18 | 3- 1-18 3- 7-18 | 30.3 48.2 | 15.75 16.9 | 1.10 1.30 | 3.16 ...... | 2+ | Few | Discharged 3-15-18 in good condition. Seen 1-7-21. Had full term child; labor and puerperium normal.

9 | M. | 8½ Mos. | Admitted 4-3-19 in labor. Delivered normally of a live child the same day. Headache throughout pregnancy, become severe with edema and epigastric pain 3-31-19. Had two convulsions before admission; four after. B. P. on admission, 190/100; on discharge 146/90. | 4- 3-19 | 4- 7-19 4-14-19 | 37.40 36.00 | 15.10 13.90 | 1.40 0.80 | 3.40 4.90 | 4+ | ...... | Seen 1-8-21. Mother and baby in good condition. Normal B. P. and urine. Refused to have blood taken.

TABLE VI.—Continued

ECLAMPSIA

Blood Specimens Postpartum

CASE	PERIOD	PARITY	CLINICAL NOTES	DATE EMPTYING UTERUS	DATE BLOOD SPECIMEN	BLOOD ANALYSIS				URINE		FOLLOW UP NOTES
						N. P. N.	UREA NTR.	CREAT-ININ	URIC ACID	ALBUMIN	CASTS	
10	9 Mos.	M.	Admitted 6-28-18. Delivered 7-2-18 of a live child, having no symptoms of toxæmia of pregnancy at this time. Three days later, suddenly developed convulsions, marked edema, followed by pulmonary edema and death. (10 convulsions.) B. P. on admission 128/85, 7-5-18, 160/120. Marked trace albumin on admission.	7-2-18	7-5-18	42.50	18.70	4.20	11.30	4+	Many	Patient died 7-6-18.
11	....	P.	Admitted 2-2-18 in convulsions. Bag inserted; delivered in 4 hours by version. B. P. 158/120. Developed multiple abscesses and transferred to surgical side on 2-16-18. Discharged A. O. R., 3-18-18.	2-2-18	2-4-18 2-6-18 2-13-18 2-18-18 2-25-18	51.04 42.2 30.5 37.5 40.5	15.9 17.9 18.7 16.0 13.6	... 1.8 1.83 1.6 0.73	5.25 7.92 1.43 .... 1.14	3+	Many	Left the hospital at her own request 3-18-18. Died at home, probably from septicemia. Baby died in the hospital from hemophilia.

by pathologic changes in the liver as well as in the kidney. The effect of the liver in altering the nitrogen partitions of the blood and urine is still imperfectly understood. Stadie and Van Slyke,[14] having recently had the opportunity to study intensively the metabolism in a case of acute yellow atrophy of the liver, found that despite the almost total destruction of the liver a large proportion of the urea was still formed. This seems to show that there is an efficient extrahepatic function in the formation of urea as was deduced by Folin and Denis.[15] Moreover, Stadie and Van Slyke found no significant reduction in the alkali reserve of the blood; but they found an increase of aminonitrogen in the blood and urine above what could be accounted for by the rapid autolysis of the liver, thus strengthening the conception of the deaminization function of the liver. We hope that our knowledge of hepatic function in terms of blood chemistry may in time so advance that we shall be able to read in the blood pictures of eclampsia, the hepatic as well as the renal disturbances.

An attempt to differentiate hepatic and renal toxemias on the basis of the nitrogen partition in the blood is not safe. To interpret a high undetermined nitrogen fraction (indicated by a low ratio of urea N. to N.P.N.) as a failure in deaminization on the part of the liver, is not justified. In our tables of normal pregnancy the ratio of urea N. to N.P.N. ranges from 12 to 59 per cent. This would imply a marked variation in the undetermined fraction even in uncomplicated pregnancy. And, again, in our eclamptic series a fatal case, demonstrating on autopsy the liver pathology of eclampsia, shows a ratio of urea N. to N.P.N., of 76 per cent, the highest of our whole series, indicating probably the lowest undetermined nitrogen fraction in the series. Foster[16] found in the study of uremia with convulsive symptoms a high undetermined nitrogen fraction (20 per cent) and for these cases there has been, as yet, no suggestion of a disturbed hepatic function.

The blood pictures resulting from renal lesions, however, have a clearer meaning to us. The kidney as a filter, the threshold of permeability for the several nitrogenous waste products, and the significance of the retention of these several partitions, have all been studied to advantage.

Analysis of the change in the blood content, both relative and absolute, of the several nitrogen waste products, has led to the belief that uric acid is the most difficult to eliminate and creatinine the easiest. Therefore with renal insufficiency the blood first discloses a uric acid retention and lastly a creatinine accumulation. Myers and Lough[17] have long maintained that a blood creatinine of 5 mg. or more per hundred c.c. warrants a grave prognosis. This thesis has been more recently strengthened in a study of a large series of cases by Myers and Kilian.[18] Myers and Fine[19] have confirmed the prevailing conceptions of kidney filtration by demonstrating an early lowering of the

Table VII

Toxemia of Pregnancy

(Without Convulsions)

CASE	PERIOD	PARITY	CLINICAL NOTES	DATE EMPTYING UTERUS	DATE BLOOD SPECIMEN	BLOOD ANALYSIS				URINE		FOLLOW UP NOTES
						N. P. N.	UREA NITR.	CREAT- ININ	URIC ACID	ALBUMIN	CASTS	
1	5 Mos.	M.	Admitted 5-11-18 in coma. No history obtained, except that she had had headache for several weeks. No convulsions. B. P. 135/115. Died within a short time after coming into the hospital.	5-14-18	5-11-18	......	40.1	....	7.80	1 +	Few	Patient died 5-11-18.
2	7 Mos.	P.	Admitted 2-22-18. Labor induced. Spontaneous labor; stillbirth. Headache, vomiting, and disturbed vision for two weeks before admission. B. P. 175/130.	2-22-18	2-25-18	10.5	15.5	1.05	1.65	1 +	2 +	Discharged from hospital improved, but could not be traced in 1920.
3	7 Mos.	M.	Admitted 5-27-18 with a history of headache, edema and dyspnoea for more than two weeks before admission. B. P., 180; heart enlarged and with mitral regurgitation. Discharged 7-6-18.	6-2-18	5-31-18 6-3-18 6-16-18 6-19-18	53.3 36.7 41.0	31.7 19.5 21.6 15.9	3.1 1.63 1.73 2.10	4.78 4.30 8.90 7.70	4 +	2 +	Seen Jan. 20-21. Cancer of breast; operated in 1918. Mitral regurgitation. B. P., 180/100; urine +, +, +; casts. Edema and headache.
4	7 Mos.	M.	Admitted 3-25-18, complaining of vomiting and edema for the past six months. B. P. 200/160. Not improving; labor induced, resulting in a stillbirth 4-25-18. B. P. on discharge, 150/100.	4-25-18	4-3-18 4-23-18 4-30-18	39.6 39.7 39.6	15.5 17.3 7.2	1.08 0.98 1.07	8.0 3.9 2.13	Boiled Solid	Few	Seen 1-20-21. Confined at Sloane May 1920; normal pregnancy; normal spontaneous labor. During pregnancy B. P. ranged from 104 to 110 systolic. Urine negative throughout antepartum period.
5	8 Mos.	M.	Admitted 7-20-18. Gave a history of having had edema, headache and disturbed vision, and vomiting for two months before admission, greatly aggravated during past week. B. P. 200/160. Labor induced 7-21-18; delivered of live child which died in short time. Patient discharged 8-1-18.	7-21-18	7-23-18 7-31-18 9-15-19 9-22-19 1-25-21	...... 43.3 35.4 41.8 58.40	16.5 16.5 22.00 18.70 25.80	3.1 2.0 0.85 0.56 1.88	7.8 4.0 3.06 1.91 2.55	7-20-18 Boiled Solid	Many	Seen 1-25-21. Induced labor at 7½ months in October, 1920. B. P., 210/120. Urine; large number. Headache and edema.

TABLE VII—Continued

| 6 | 8 Mos. | P. | Admitted 6-9-18 in coma. No history obtainable. Marked edema of legs and face. Bag inserted. Delivered macerated 8-months' fetus. B. P. 160/90. | 6-10-18 | 6- 9- 6-11-18 18 | 106.0 116.0 | 80.0 86.0 | 6.50 6.60 | 8.70 9.10 | | Many | Patient died. |
| 7 | 9 Mos. | P. | Admitted 6-1-18 in coma with stertorous breathing. No edema. Only history obtainable, one of sudden onset day before admission, with severe headache, vomiting and epigastric pain. Labor induced immediately. Patient died the same day. B. P., 230/150. | 6- 1-18 | 6- 1-18 | 63.0 | 34.6 | 4.8 | 8.0 | .... | Many | Mother and child died. 6-1-18. |

renal permeability to uric acid, a later lowering to urea and lastly to creatinine. The retention of the nitrogen waste products in the blood of eclampsia and toxemia is very much lower than that found in uremia. The figures are also lower than those found in acute nephritis The blood pictures do not correspond with any of the usual nephritic pictures but come closer to those found in the so-called "parenchymatous" nephritis. The findings in toxemia and eclampsia of investigators already quoted are in accord with ours.

In the 34 cases of eclampsia and toxemia of pregnancy included in the tables, there are 26 typical eclampsias; three others were admitted in coma without convulsions and were clinically considered uremics; four cases were considered preeclamptic; and one was an epileptic with added toxemia during pregnancy.

It is necessary in studying individual blood pictures of these conditions to remember that we are dealing with an acute and violent disturbance which tends rapidly to subside or to end in death; and also that the blood picture changes as rapidly, following the clinical course. In order to define, therefore, the significance of a blood picture it is necessary to know the time relation between the taking of the blood and the onset of symptoms or of labor. The importance of this is illustrated in several of our cases where the blood was taken after convalescence was established and in which we find nearly normal blood pictures.

The average blood picture for these 34 cases is as follows:

N.P.N.	UREA N.	CREATININ	URIC ACID	U.N. TO N.P.N.
49.7	26.	2.17	6.19	52 per cent

The average ratio of urea N. to the total N.P.N. for the entire series is as shown, 52 per cent. The highest ratio that we find is 76 per cent and the lowest is 33 per cent. In the case with a ratio of 76 per cent there was marked kidney insufficiency, as evidenced by the complete suppression of the urine. In this case the autopsy findings, besides showing kidney involvement, showed the changes in the liver typical of eclampsia.

In this series we find that in every case where there was high retention of all the blood constituents, indicating a marked kidney insufficiency, the patient died. In some cases the kidneys are but slightly involved, as shown by the fact that the blood taken two days postpartum gave practically a normal blood picture.

Again, the significance of a high creatinine retention in denoting kidney insufficiency is well shown by our tables. Frequently it accompanies high retentions in other nitrogenous waste products, but occasionally the creatinine and the uric acid are the only constituents that are definitely raised in the blood picture. Out of 9 cases showing creatinine above 3 mg. as many as 5 died; and two afterwards developed into chronic nephritics. The remaining two, when seen thirty

months later, had had normal pregnancies and showed no signs of nephritis. Altogether there are nine deaths in this entire series and the creatinine was found to be high in five of them. In one of the other four cases the creatinine is not given; but from the marked urea retention we may infer a probably high creatinine. Two others of the nine show normal creatinine; but the bloods were taken from three to seven days before death. The remaining one, who died the same day the blood was taken, entered the hospital at the height of the influenza epidemic with a typical eclamptic seizure, but also having a temperature of 103° and with pulmonary involvement. It is possible that the eclampsia in this case was a complication of influenza. The blood creatinine may therefore be regarded as of value in estimating the degree of renal insufficiency; and its elevation above 3 mg. would justify a guarded prognosis both for the immediate future and for subsequent pregnancies.

In the entire series, both in the preeclamptic condition and in eclampsia, we find a high retention of uric acid. In some cases it is the only nitrogen waste product which is very much raised. In another extensive series of cases, which we are not including in this report, since the examinations were made in another laboratory, we also have found a uniform increase in uric acid in preeclamptic conditions before labor. In none of the cases that recovered have we found the patient showing any symptoms of nephritis where the uric acid returned to normal early in convalescence. On the other hand, where the uric acid remains high throughout the obstetrical period, especially if there has been a high creatinine retention, we find, according to the "follow-up" notes about thirty months later, that the patient is a chronic nephritic.

A question with which an obstetrician after taking care of a case of eclampsia, is invariably confronted, is whether this woman can safely go through another pregnancy, or whether future pregnancies will again endanger her life. Clinically, we depend for an answer upon the rapidity with which albuminuria clears up and the blood pressure returns to normal. If the kidneys have not been seriously injured, we can say that the patient will probably not have eclampsia again. The blood pictures, added to the clinical findings, are of great value in making this prognosis.

Of the 34 cases here reported we find that nine died in the hospital and one from an infection a short time after leaving the hospital. Twenty-two of the remaining 24 cases were seen during December, 1920, and January, 1921, that is, about 30 months after their eclamptic seizures. Among these we find only two definite nephritics. In looking at the blood pictures of these two cases, we find that the uric acid remained especially high throughout the obstetrical period; that the other waste products also failed to return to normal; and that in both cases the creatinine was more than 3 mg.

According to the follow-up reports, ten women have had perfectly normal subsequent pregnancies and labor. In each of these ten cases the blood picture shows a slight retention of all the waste products with a rapid return to normal, indicating only slight kidney insufficiency. In such cases, therefore, one is justified in giving a hopeful prognosis for subsequent pregnancies.

The histories in this entire series of eclampsias emphasize the great importance of prenatal care. For in the majority of cases there were premonitory warnings, sometimes a few days, sometimes several weeks, before the eclamptic seizures developed.

The blood pictures in preeclamptic conditions, since they indicate the extent of kidney insufficiency, are of value both in prognosis and in outlining the treatment.

SUMMARY AND CONCLUSIONS

I. In normal pregnancy, as compared with the nonpregnant state, we find a low total of nonprotein nitrogen, low urea nitrogen and a very low ratio of urea nitrogen to the total nonprotein nitrogen.

II. The excretory nitrogenous constituents in the maternal and the fetal circulations at the end of labor are practically identical.

III. A definite retention of uric acid in the blood at the end of labor is found only in abnormal cases.

IV. The blood pictures in eclampsia and toxemia of pregnancy are interpreted most readily in terms of kidney insufficiency.

V. The significance of a given blood picture can be defined only in the light of the clinical conditions at the exact time when the blood was taken.

VI. Marked kidney insufficiency, indicated by high retention of nitrogenous waste products, warrants a very grave prognosis.

VII. High creatinine retention seems to warrant a serious prognosis.

VIII. When the nitrogenous constituents do not return to normal early in convalescence, a doubtful prognosis for subsequent pregnancies is justified.

IX. A rapid return of the blood picture to normal justifies a favorable prognosis for subsequent pregnancies.

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58 WEST FIFTY-FIFTH STREET.

A STUDY OF THE OSSIFICATION CENTERS OF THE WRIST, KNEE AND ANKLE AT BIRTH, WITH PARTICULAR REFERENCE TO THE PHYSICAL DEVELOP- MENT AND MATURITY OF THE NEWBORN

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ALTHOUGH numerous studies have been made of the prenatal and postnatal course of the ossification of the extremities, systematic observations on the occurrence of ossification centers in the joints at birth are limited to the roentgenographic studies of Pozier (1912) and Hasselwander (1909) and certain earlier medicolegal work. Pozier's study, while based on a large series of cases, was confined to an examination of the ossification of the knee joint in the newborn. Has- selwander studied the ankle only. Students of legal medicine who have investigated this problem have generally limited themselves to the study of the inferior femoral epiphysis, although Corrado (1891) and Toldt (1882) studied both the knee and the ankle centers by section at autopsy. Aside from a series of 10 cases examined by Puyhaubert (1913) no systematic study has been made of ossification of the carpus at birth.

The present study was undertaken with the object of determining the condition of the ossification centers of the wrist, knee and ankle in the newborn, their interrelationships, and particularly their re- lation to the maturity and to the size of the child. Incidentally we have considered the effect of parity and sex upon the condition of these centers at birth.

Our material consisted of 100 newborn children (45 females and 55 males) taken *seriatim* from the service of the senior author in the Maternity Ward of the Swedish Hospital of Minneapolis. Each of these children was weighed and was measured for total length, and radiographs were made of the ankles, knees and wrists of both sides within 48 hours after birth. The menstrual history of each case was also determined with care, and may be regarded as quite reliable since the mothers were all patients of the better class and of considerable intelligence.*

Of the 100 children studied, 45 were females and 55 were males. The average weight of the entire group was 3374 grams. The females ranged from 2185 to 4440 grams in weight, the average being 3367 grams. The males averaged 3380 grams in weight, the minimum being 2080 grams and the maximum 5060 grams. The average length of the females was 50 cm., the minimum 43 cm. and the maximum 54 cm. The average length of the males was 50.5 cm., the minimum 42 cm. and the maximum 55 cm. The average period of gestation, as calculated from the first day of the last menstruation, was 280 days. The minimum was 233 days and the maximum was 312 days. Of these cases two males and two females were frankly premature as evidenced both
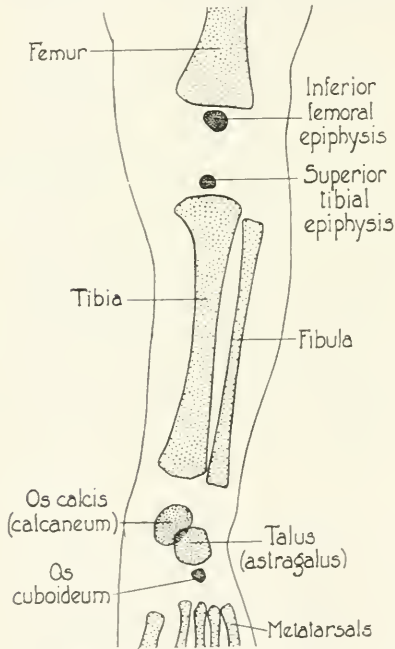
Fig. 1.—Tracing of a radiogram of the right leg of a full-term newborn child showing the various ossific masses. The epiphyses and the os cuboideum are indicated in heavy stipple in this and the following figures of the lower extremity.
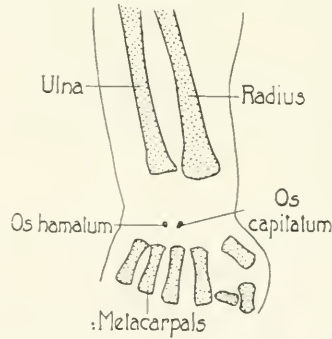
Fig. 2.—Tracing of a radiogram of the right hand of a full-term newborn child showing the various ossific masses.

by the weight and length and by the menstrual history. The body lengths and weights of three of the male infants distinctly indicated postmaturity although the menstrual history did so in one instance only. Of the hundred children, 64 were firstborn. There were no multiple births in the series.

The ossification centers under consideration will be taken up in the following order; knee, ankle and wrist. Figures 1 and 2 are tracings of radiographs of these regions in the newborn and the various ossific masses which they show have been labeled in accordance with the nomenclature employed in our descriptions.

THE CENTERS OF OSSIFICATION OF THE KNEE

The Inferior Femoral Epiphysis.—This center was present in 98 per cent of our cases, being absent only twice (in one female and in one male, both of which were frankly premature).

The course of ossification of the inferior extremity of the femur is probably better known than that of any other part of the skeleton. Early in the nineteenth century (1819) Beclard pointed out the significance of this center as a test of the maturity of the newborn. This lead to a series of extended studies of the subject by investigators in legal medicine, among the more important being those of Mildner (1850), Böhm (1858), Pleissner (1861), Casper (1862), Hartmann (1869), Barkow (1872), Toldt (1882), Corrado (1891), Tammasia
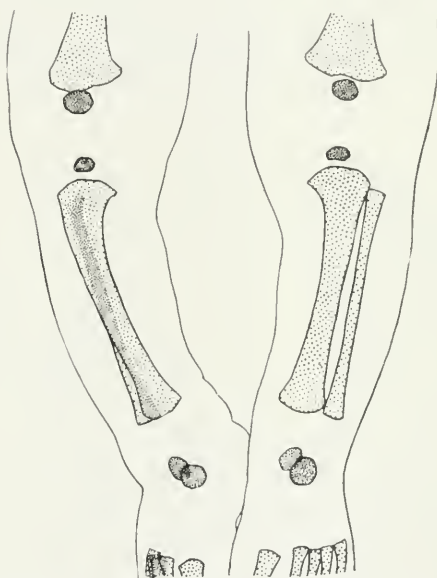
Fig. 3.—Tracing of a radiogram of the lower extremities of a male newborn of 289 days' gestation, having a birth weight of 3350 grams and a total length of 51.5 cm. Large knee centers but no cuboid centers.

(1893), and Guichard (1905) all of whom studied the center by section at autopsy. The only extensive radiographic study of the knee of the newborn is that of Pozier (1912) who examined 212 cases. A comprehensive survey of the literature on the subject would probably enable one to bring together records of the development of this center in over 2000 cases in late fetal life and early infancy. From the literature available to us we have collated the records of over 1600 cases and these, together with our series (making a total of 1717 observations), are shown in Table I and are illustrated graphically by the solid line curve in Fig. 26.

TABLE I*

FREQUENCY OF THE OSSIFICATION OF THE INFERIOR FEMORAL EPIPHYSIS IN LATER FETAL LIFE AND IN EARLY INFANCY

AGE	TOTAL NUMBER OF CASES	NUMBER OF CASES SHOWING A CENTER OF OSSIFICATION	PER CENT OF CASES SHOWING A CENTER OF OSSIFICATION
Seventh fetal month	29	0	0.0
Eighth fetal month	143	7	4.9
Ninth fetal month	181	58	32.0
Tenth fetal month	271	228	84.1
Birth and first week	1004	955	95.1
Second week	42	41	97.6
Third and fourth weeks	70	69	98.6
Second and third months	27	27	100.0

*In tables I, II and III the specimens have been classified on the basis of the original observer's estimate of age or, when this was lacking, on the basis of total body-length interpreted by Hasse's rule.

These data indicate that the appearance of this center prior to seven fetal (lunar) months is extremely exceptional. However, the center may be found in the eighth fetal month, as our data indicate
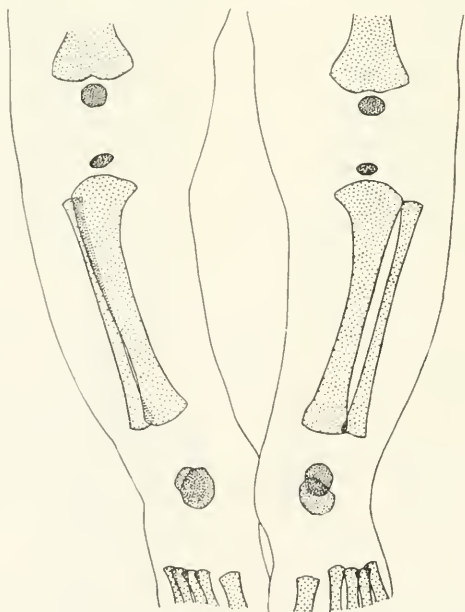
Fig. 4.—Tracing of a radiogram of the lower extremities of a female newborn of 280 days' gestation, having a birth weight of 4440 grams and a total length of 52 cm. Specimen of unusually large dimensions and with large knee centers but no cuboid ossification.

that it is present in approximately 1 case in 20. In the ninth fetal month the frequency of its occurrence rises rapidly, the average for the period being 32 per cent or about 1 case in 3. By the close of the ninth month the center is present in 60 per cent of all cases. This rapid ossification continues through the greater part of the tenth month, the average frequency for this period being 84.1 per cent, or

about 6 cases in 7. In the full-term newborn the data indicate that
the center is present in about 19 cases in 20. The remaining moiety of
the cases ossify rather slowly in the first postnatal month. This may
indicate a small group of individuals tending to some perversion of
bone development such as fetal rachitis.

On the whole these figures demonstrate that the ossification of the
inferior femoral epiphysis is somewhat more precocious than the
statements of a number of recent authors would indicate. Since the
curve based on the combined data shows that this center is present in
fully 50 per cent of all cases in the thirty-sixth week, it is evident
that the value of this center as positive evidence of maturity is limited, al-
though as it is usually absent prior to the twenty-eighth week, its presence
may be taken as a practically certain indication of viability.

The Superior Tibial Epiphysis.—A definite ossific mass was present
in the superior extremity of the tibia in 81 per cent, or slightly more
than four-fifths of our series.

TABLE II

FREQUENCY OF THE OSSIFICATION OF THE SUPERIOR TIBIAL EPIPHYSIS IN LATER
FETAL LIFE AND AT BIRTH

AGE	TOTAL NUMBER OF CASES	NUMBER OF CASES SHOWING A CENTER OF OSSIFICATION	PER CENT OF CASES SHOWING A CENTER OF OSSIFICATION
Seventh fetal month	17	0	0.0
Eighth fetal month	34	0	0.0
Ninth fetal month	51	3	5.9
Tenth fetal month	213	88	41.3
Birth	253	195	77.1

The ossification of the superior epiphysis of the tibia has not been
the subject of as much investigation as has the inferior femoral. The
three main sets of observations on this point of ossification are those
of Toldt (1882), Corrado (1891) and Pozier (1912), although Kjölseth
(1913) has also reported a few observations. These records, together
with our own data (making a total of 568 cases), are summarized in Table
II and are shown in graphic form by broken line curve in Fig. 26.

The superior tibial epiphysis appears distinctly later than the inferior
femoral. It is apparently always absent in the seventh and eighth
months, although one instance of its occurrence in a female fetus of
40 cm. has been reported by Hassenstein (1892). In the ninth month
its average frequency for the entire period is approximately 6 per
cent, or about 1 case in 17, and according to our graph it is present
in about 15 per cent at the end of this time. In the tenth month
ossification proceeds very rapidly, the average frequency for the
period being slightly above 40 per cent, or about 2 cases in 5. In
full-term newborn children this center is present in 75 to 80 per cent
of all cases.

Although definite statements regarding the time of appearance of this center are generally lacking even in more recent publications, it is evident from the study of the data presented in the literature and from our own observations that this point of ossification is a better test of maturity than is the inferior femoral epiphysis. The presence
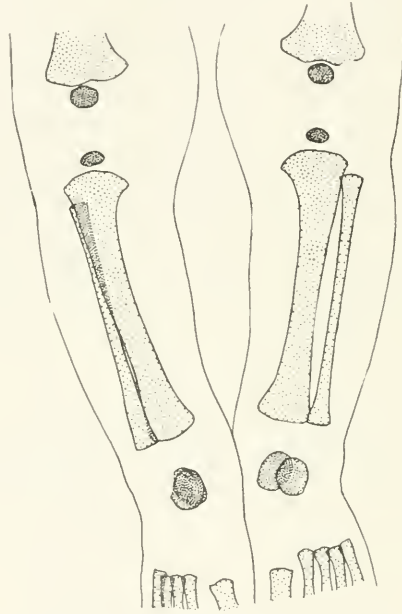
Fig. 5.—Tracing of a radiogram of the lower extremities of a female newborn of 287 days' gestation, having a birth weight of 3390 grams and a total length of 53 cm. Specimen of large dimensions and with large knee centers but no ossification of the cuboid.

of this center indicates in 5 cases out of 6 that the child has passed the ninth fetal month. The lack of this center, however, does not necessarily indicate prematurity as it is absent in nearly a fourth of full-term children at birth.

TABLE III

FREQUENCY OF THE OSSIFICATION OF THE CUBOID IN LATER FETAL LIFE AND AT BIRTH

AGE	TOTAL NUMBER OF CASES	NUMBER OF CASES SHOWING A CENTER OF OSSIFICATION	PER CENT OF CASES SHOWING A CENTER OF OSSIFICATION
Seventh fetal month	17	0	0
Eighth fetal month	34	0	0
Ninth fetal month	45	2	4.4
Tenth fetal month	84	23	27.4
Birth	127	77	60.6

THE BONES OF THE ANKLE

The Astragulus (Talus) and Calcaneus.—The calcaneus is the first bone of the ankle to ossify, making its appearance about the fifth

fetal month, and the astragulus undergoes ossification soon thereafter. As these bones were present in all of our cases, as well as in all similar cases reported by others, they require no further discussion.

The Cuboid.—The ossification of the os cuboideum was indicated in 38 per cent of the cases of our series.

The development of the cuboid has been studied by Toldt (1832), Corrado (1891), and Hasselwander (1909) who examined an aggregate of 256 cases. Kjölseth (1913) also studied a small series of cases but her results are published in such form that we cannot include them in our tabulations. The summary of all cases, including our series—a total of 356 cases—is given in Table III and is illustrated by the curve in dotted line in Fig. 26.

Ossification begins in the cuboid, as in the superior tibial epiphysis, in the first part of the ninth fetal month, but proceeds more slowly. The average frequency for the month is 4 per cent, or 1 case in 25. At the end of the ninth month it is present in approximately 12 per cent of all cases, or about 1 case in 8. Like the superior tibial, the frequency of the cuboid center of ossification rises very rapidly in the last fetal month, the average for the period being 26 per cent. In the full-term newborn child the center is present in 60 per cent, or three-fifths of all cases. Thus the significance of the ossification of the cuboid as a test of maturity at birth is about the same as that of the superior tibial epiphysis. Its presence indicates a little more definitely that the child has passed the ninth fetal month but since it is not found in 40 per cent of full-term newborn children its absence cannot be regarded as significant of prematurity.

THE OSSIFICATION OF THE WRIST

The wrist is generally described as cartilaginous at the time of birth although no extensive studies have been made on the condition of the carpus in the newborn. Two bones of the carpus may be present at this time, the os capitatum (magnum) and the os hamatum (unciform). The older writers, who depended on autopsy specimens for their information, Rambaut et Renaut (1864), Béclard (1819), Sappey (1889), Debierre (1889) and others, generally described the os capitatum and os hamatum as appearing between the first and third years, although Meckel (quoted by Puyhaubert 1913) found it present at birth. Students employing radiography, on the other hand, usually report these bones as appearing somewhat earlier. Pryor (1908), whose work on the ossification of the hand is perhaps the most careful and extensive study to date, found that the os capitatum and os hamatum appeared between the third and sixth postnatal months in females and between the fifth and tenth postnatal months in males. Hess (1917) states that these centers may be seen only very rarely at the time of birth. Puyhaubert (1913) examined the

wrists of 10 newborn children and found that the capitatum and the hamatum were present in 2 cases. He concluded that the usual time of the ossification of the hamatum was during the first year and of the capitatum from the last fetal month to the close of the first year of extrauterine life. We found some evidences of ossification in the wrist in 15 instances of the series of 100. This indicates that Puyhaubert's figures are a little high, probably through chance in working with such a small series. The os capitatum alone was present in 7 instances, or nearly one-half of the cases showing carpal ossification. In most of the instances in which both points of ossification were present the os capitatum was apparently the larger, although this was not always true. In no case did we find the os hamatum alone present. There has been considerable difference of opinion as to which of these centers is the first to appear. Brice (in Quain 1915) and Nomballais (1909) state that the hamatum is the first to appear. Fuginami (1911) and Rotch (1909) recognize no distinction in the time of appearance of the two centers and Pryor (1908) and Puyhaubert (1913), who have done the most recent work on the subject, regard the capitatum as the first to ossify. Our observations indicate that the last view is the correct one, although the difference in the time of the inauguration of ossification in the two bones cannot be very great.

RELATION BETWEEN OSSIFICATION AND BODY-LENGTH

The relation in our material between body-length and ossification is shown in Table IV. In studying this relation the cases were arranged according to total body-length in 4 classes of which the first 3 were each of 4 centimeters range and the last included all cases of 52 cm. or more.

The inferior femoral center was present in one-half of the cases falling between 40 and 44 cm. and in all cases above 44 cm.

The superior tibial center is closely correlated with body-length. It was present in one-quarter of the cases under 44 cm. and in nearly one-half of the cases between 44 and 48 cm. It was found in approximately five-sixths of all cases of 48 cm. and over, which may be regarded as a mature birth-length.

A peculiar and no doubt accidental condition was found in the relation of the ossification of the os cuboideum to the body-length. The center was present in one-half of the 4 cases having a length of less than 44 cm. and only 22 per cent of those of 44 to 48 cm. But with this exception it occurs in a progressively higher percentage with increasing body-length. It was present in about two-fifths of all children of 48 cm. and over.

No ossification centers in the carpal bones were seen in children of less than 44 cm. in length. The os capitatum was present in approxi-

mately one-tenth of all cases having a body-length between 44 and 52 cm. and in about one-quarter of cases of 52 cm. and over. The os hamatum was present in about 6 per cent of cases between 44 and 52 cm. and in about 1 case in 8 of children of 52 cm. and over.

RELATION OF OSSIFICATION TO BODY WEIGHT

The relation of ossification of the various centers under consideration to the weight of the body is shown in detail in Table V, which is of the same general arrangement as Table IV. The various centers will be considered in the order of their appearance.

The inferior femoral epiphysis was present in all of our series, of both sexes, which had a birth weight of 2500 grams or over. In the group of lightest cases (having a birth-weight of 2000 to 2500 grams) the center was present in 50 per cent of the females and in 75 per cent of the males, or in approximately 67 per cent of all cases of this weight. As 2500 grams is probably to be regarded as a very low limit for the normal weight of full-term infants it is probably safe to say that practically all newborn children who exceed the minimum birth weight of maturity possess the inferior femoral epiphysis.

The superior tibial epiphysis also shows a close relation to body-weight. It was absent in all of the females under 2500 grams in weight, in three-fourths of the males and in five-sixths of the total number of cases in this group. The center was present in 83 per cent of children of 2500 grams and over and in 85 per cent of children of 3000 grams or over. It was constantly present only in our group of heaviest cases (4000 grams or over). Thus this center may be expected in approximately five-sixths of all newborn children of mature birth-weight.

These results may be compared with those of Pozier (1912) who also studied the ossification of the knee centers of the newborn by means of radiography. He found the inferior femoral center present in 72 per cent of cases having a birth-weight between 2000 and 2500 grams but only in children of 4000 grams and above was the center constantly present. The average weight of the newborn in Paris is distinctly less than that which has been noted in Minneapolis (approximately 3.23 kg. as compared with 3.38 kg.). This difference might account for the greater frequency of ossification in the group of lighter children but it offers no explanation for the lower frequency of ossification in children of medium weight. The same condition is true for the superior tibial epiphysis since Pozier found this center present in approximately the same per cent of lighter cases as we did, while it was present in a distinctly lower percentage of children of medium weight (3000 to 4000 grams). In the main the results of Pozier and the present findings agree in that frequency of the center is fairly closely related to body-weight.

The os cuboideum, when regarded without distinction of sex, also shows a close correlation to body-weight. It was present in approximately one-sixth of all cases between 2000 and 2500 grams and is found in a progressively increasing percentage of cases up to the group of greatest body-weight (4000 grams and over) where it is noted in about 3 cases out of 5.

The os capitatum (os magnum) was not found in any cases having a body-weight under 2500 grams. It was present in about one-sixth of all cases between 2500 and 4000 grams showing very little correlation with body-weight within these limits. In the group of cases of 4000 grams and over it was present in three cases out of five,—the same frequency as was observed for the os cuboideum.

The os hamatum showed much the same character in its distribution, although it was less frequent than the os cuboideum or os capitatum. It was present in no cases having a body-weight of less than 2500 grams, in about one case in 20 of the children weighing between 2500 and 4000 grams and in 2 out of 5 of the children of 4000 grams and over.

THE RELATION OF OSSIFICATION TO MENSTRUAL AGE

We have estimated the length of gestation of our cases from the menstrual histories, the period of conception being calculated from the first day of the last menstrual period. The relation between body-weight, body-length and the frequency of the various ossification centers to the duration of pregnancy, as determined by this criterion, is shown in Table VI. In this table we have arranged the material in eight groups of ten day periods of menstrual age.

Roughly three-fourths of our cases fall in Groups V, VI and VII ranging in menstrual age from 270 to 300 days. Within these limits the relation between the average body-weight, average body-length and menstrual age is quite constant as both of these values rise steadily with the increasing menstrual age. The percentage frequency of the various centers of ossification studied also shows a close correlation with menstrual age in these groups. The only instance in which the frequency of ossification did not rise with increasing age was in the case of the os hamatum in Groups VI and VII where the cases in which the center was present were less numerous in the larger group. This is probably a chance variation due to the small number of instances in which this center was present.

If, however, one examines the *entire* series of cases the constancy of the relation of menstrual age to bodily development (length and weight) and skeletal development is much less evident and certain striking exceptions appear. This is true of both the younger and the older groups of children. In Group III (250 to 260 days) the body-weight is greater than in any succeeding group and both the body-

TABLE IV

FREQUENCY OF OSSIFICATION OF THE INFERIOR FEMORAL EPIPHYSIS, SUPERIOR TIBIAL EPIPHYSIS, OS CUBOIDEUM, OS CAPITATUM AND OS HAMATUM IN 100 NEWBORN CHILDREN ARRANGED ACCORDING TO BODY-LENGTH

SEX	BODY-LENGTH (CM)	NUMBER OF CASES	INFERIOR FEMORAL EPIPHYSIS		SUPERIOR TIBIAL EPIPHYSIS		OS CUBOIDEUM		OS CAPITATUM (MAGNUM)		OS HAMATUM (UNCIFORM)	
			No.	%	No.	%	No.	%	No.	%	No.	%
Females	40 to 44	2	1	(50)	1	(50)	2	(100)	0	(0)	0	(0)
	44 to 48	5	5	(100)	2	(40)	1	(20)	1	(20)	1	(20)
	48 to 52	27	27	(100)	24	(89)	12	(44)	4	(15)	3	(11)
	52 and over	11	11	(100)	10	(91)	5	(45)	1	(9)	1	(9)
	All females	45	44	(98)	37	(82)	20	(44)	6	(13)	5	(11)
Males	40 to 44	2	1	(50)	0	(0)	0	(0)	0	(0)	0	(0)
	44 to 48	4	4	(100)	2	(50)	1	(25)	1	(25)	0	(0)
	48 to 52	28	28	(100)	23	(82)	8	(29)	1	(4)	0	(0)
	52 and over	21	21	(100)	17	(81)	9	(43)	7	(33)	3	(14)
	All Males	55	54	(98)	42	(76)	18	(33)	9	(16)	3	(6)
Both Sexes	40 to 44	4	2	(50)	1	(25)	2	(50)	0	(0)	0	(0)
	44 to 48	9	9	(100)	4	(44)	2	(22)	2	(22)	1	(1)
	48 to 52	55	55	(100)	47	(85)	20	(36)	5	(9)	3	(6)
	52 and over	32	32	(100)	27	(84)	14	(44)	8	(25)	4	(13)
	All Cases	100	98	(98)	79	(79)	38	(38)	15	(15)	8	(8)

TABLE V

FREQUENCY OF OSSIFICATION OF THE INFERIOR FEMORAL EPIPHYSIS, SUPERIOR TIBIAL EPIPHYSIS, OS CUBOIDEUM, OS CAPITATUM AND OS HAMATUM IN 100 NEWBORN CHILDREN ARRANGED ACCORDING TO BODY-WEIGHT

SEX	BODY WEIGHT (KG)	NUMBER OF CASES	INFERIOR FEMORAL EPIPHYSIS		SUPERIOR TIBIAL EPIPHYSIS		OS CUBOIDEUM		OS CAPITATUM (MAGNUM)		OS HAMATUM (UNCIFORM)	
			No.	%	No.	%	No.	%	No.	%	No.	%
Females	2.0 to 2.5	2	1	(50)	0	(0)	1	(50)	0	(0)	0	(0)
	2.5 to 3.0	7	7	(100)	4	(57)	2	(29)	1	(14)	1	(14)
	3.0 to 3.5	21	21	(100)	18	(86)	6	(29)	2	(10)	2	(10)
	3.5 to 4.0	11	11	(100)	11	(100)	9	(82)	1	(9)	1	(9)
	4.0 & over	4	4	(100)	4	(100)	2	(50)	2	(50)	1	(25)
	All females	45	44	(98)	37	(82)	20	(44)	6	(13)	5	(11)
Males	2.0 to 2.5	4	3	(75)	1	(25)	0	(0)	0	(0)	0	(0)
	2.5 to 3.0	4	4	(100)	3	(75)	0	(0)	0	(0)	0	(0)
	3.0 to 3.5	21	21	(100)	17	(81)	7	(33)	7	(33)	0	(0)
	3.5 to 4.0	20	20	(100)	15	(75)	7	(40)	3	(15)	0	(0)
	4.0 & over	6	6	(100)	6	(100)	4	(67)	4	(67)	3	(50)
	All Males	55	54	(98)	42	(76)	18	(33)	14	(25)	3	(6)
Both Sexes	2.0 to 2.5	6	4	(67)	1	(17)	1	(17)	0	(0)	0	(0)
	2.5 to 3.0	11	11	(100)	7	(64)	2	(18)	1	(9)	1	(9)
	3.0 to 3.5	42	42	(100)	35	(83)	13	(31)	9	(21)	2	(5)
	3.5 to 4.0	31	31	(100)	26	(84)	16	(55)	4	(13)	1	(3)
	4.0 & over	10	10	(100)	10	(100)	6	(60)	6	(60)	4	(40)
	All Cases	100	98	(98)	79	(79)	38	(38)	20	(20)	8	(8)

length and the ossification is much further advanced than one might expect from the apparent duration of pregnancy. In Group II while

TABLE VI

Frequency of Ossification of the Inferior Femoral Epiphysis, Superior Tibial Epiphysis, Os Cuboideum, Os Capitatum and Os Hamatum in 100 Newborn Children Arranged According to Menstrual Age

GROUP NUMBER	NUMBER OF CASES	RANGE OF MENSTRUAL AGE (DAYS)	AVERAGE MENSTRUAL AGE (DAYS)	AVERAGE BODY-WEIGHT (GM.)	AVERAGE TOTAL BODY-LENGTH (CM.)	FREQUENCY OF:									
						INFERIOR FEMORAL EPIPHYSIS		SUPERIOR TIBIAL EPIPHYSIS		CUBOID		OS CAPITATUM		OS HAMATUM	
						NO.	PER CENT	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT
I	2	230-240	235	2068	43	1	50	0	0	0	0	0	0	0	0
II	3	240-250	248	2525	45	3	100	3	100	2	67	0	0	0	0
III	4	250-260	256	2708	50.5	4	100	3	75	1	25	1	25	1	12
IV	8	260-270	264	3205	50	8	100	5	63	2	25	1	12	1	12
V	25	270-280	275	3318	49.5	24	96	20	80	5	20	2	8	3	4
VI	35	280-290	284	3476	50.5	34	97	28	80	11	31	5	14	3	9
VII	14	290-300	293	3555	51	14	100	14	100	12	86	3	21	2	7
VIII	7	300 & over	305	3335	51	7	100	6	86	5	71	2	29	2	29

TABLE VII

Comparative Frequency of the Ossification of the Superior Tibial Epiphysis, the Inferior Femoral Epiphysis and the Os Cuboideum Classified by Total Body-Length in Male and Female Fetuses and Newborn Children

BODY-LENGTH (CM.)	INFERIOR FEMORAL EPIPHYSIS				SUPERIOR TIBIAL EPIPHYSIS				OS CUBOIDEUM			
	MALES		FEMALES		MALES		FEMALES		MALES		FEMALES	
	NUMBER OF CASES	FREQUENCY OF OSSIFICATION (PER CENT)	NUMBER OF CASES	FREQUENCY OF OSSIFICATION (PER CENT)	NUMBER OF CASES	FREQUENCY OF OSSIFICATION (PER CENT)	NUMBER OF CASES	FREQUENCY OF OSSIFICATION (PER CENT)	NUMBER OF CASES	FREQUENCY OF OSSIFICATION (PER CENT)	NUMBER OF CASES	FREQUENCY OF OSSIFICATION (PER CENT)
40 to 45	25	16.0	26	30.8	23	0.0	20	10.0	17	0.0	19	10.5
45 to 50	113	78.7	109	92.6	100	37.0	102	53.8	31	12.7	33	33.3
50 to 55	127	96.0	97	98.9	122	83.0	91	85.9	54	33.3	47	53.2
55 and over	13	100.0	2	100.0	13	100.0	1	100.0	5	100.0	—	—

the body-length and body-weight are in keeping with the supposed age the ossification is much in advance of it. On the other hand the body-weight of Group VIII (300 days and over) is distinctly below the average weight in Groups III, VI and VII (250 to 260, 280 to 290 and 290 to 300 days respectively) and corresponds quite closely to that of Group V (270 to 280 days). The body-length corresponds quite closely to that of Groups III, VI and VII. The frequency of the ossification of the superior tibial epiphysis and the os cuboideum is distinctly less than in the preceding (and presumably younger group of cases) although the frequency of the ossification of the bones of the wrist is somewhat greater.

TABLE VIII

COMPARATIVE FREQUENCY OF THE INFERIOR FEMORAL EPIPHYSIS IN MALES AND FEMALES IN LATER FETAL LIFE AND AT BIRTH

BODY-LENGTH	FEMALES			MALES		
	TOTAL NUMBER OF CASES	NUMBER OF CASES SHOWING CENTER	PER CENT OF CASES SHOWING CENTER	TOTAL NUMBER OF CASES	NUMBER OF CASES SHOWING CENTER	PER CENT OF CASES SHOWING CENTER
Group A Males—40 to 45 cm. Females—39 to 44 cm.	26	7	25.9	25	4	16.0
Group B Males—45 to 50 cm. Females—44 to 49 cm.	76	67	88.1	113	89	78.7
Group C Males 50 to 55 cm. Females—49 to 54 cm.	124	122	98.4	127	122	96.0
Group D Males—55 cm. and over Females—54 cm. and over	5	5	100	13	13	100

TABLE IX

COMPARATIVE FREQUENCY OF THE SUPERIOR TIBIAL EPIPHYSIS IN MALES AND FEMALES IN LATER FETAL LIFE AND AT BIRTH

BODY-LENGTH	FEMALES			MALES		
	TOTAL NUMBER OF CASES	NUMBER OF CASES SHOWING CENTER	PER CENT OF CASES SHOWING CENTER	TOTAL NUMBER OF CASES	NUMBER OF CASES SHOWING CENTER	PER CENT OF CASES SHOWING CENTER
Group A Males—40 to 45 cm. Females—39 to 44 cm.	17	1	6.0	23	0	0.0
Group B Males—45 to 50 cm. Females—44 to 49 cm.	71	33	46.5	100	37	37.0
Group C Males—50 to 55 cm. Females—49 to 54 cm.	125	97	77.6	122	89	83.0
Group D Males—55 cm. and over Females—54 cm. and over	4	4	100.0	13	13	100.0

These discrepancies in body-weight, body-length and in the state of the ossification centers in the outlying groups of children when classified by menstrual age seem to us to indicate the great inaccuracies in determining the age of apparently premature and postmature children from the date of the last menstruation alone. This error is evidently twofold, for we find a group of relatively mature children with an average menstrual age of nearly one lunar month (24 days) less than the general average and a group of relatively immature children with an average menstrual age nearly one lunar month (25 days) above the average of all cases. While undoubtedly, in certain instances, the children of these outlying groups are definitely premature or postmature the majority of cases fall in these groups because of inaccuracies in determining the exact duration of prenatal life from the menstrual data. In Group III in particular menstruation probably occurred after conception had taken place, while in Group VIII a menstrual period may have been missed before conception occurred. This speculation would hold true even if we accept the modern opinion that a pregnancy may begin at any time in the intermenstrual period.

As previously stated, we believe that our records of menstrual history are quite accurate for they were obtained by careful inquiry from intelligent patients in private practice. Certainly they are much more precise than the general type of records secured in large maternities accepting all classes. We feel that our data add further evidence of the frequent unreliability of menstrual age, and another argument against the induction of labor at a predetermined date based on the menstrual history.

TABLE X

COMPARATIVE FREQUENCY OF THE CENTER OF OSSIFICATION OF THE CUBOID IN MALES AND FEMALES IN LATER FETAL LIFE AND AT BIRTH

	FEMALES			MALES		
BODY-LENGTH	TOTAL NUMBER OF CASES	NUMBER OF CASES SHOWING CENTER	PER CENT OF CASES SHOWING CENTER	TOTAL NUMBER OF CASES	NUMBER OF CASES SHOWING CENTER	PER CENT OF CASES SHOWING CENTER
Group A Males—40 to 45 cm. Females—39 to 44 cm.	12	2	16.7	17	0	0
Group B Males—45 to 50 cm. Females—44 to 49 cm.	33	5	15.1	31	4	13
Group C Males—50 to 55 cm. Females—49 to 54 cm.	77	29	37.7	54	18	33
Group D Males—55 cm. and over Females—54 cm. and over	5	1	20.0	5	5	100

RELATION OF OSSIFICATION TO SEX

It is well known that in postnatal life the development of the skeleton proceeds at a more rapid rate and is completed sooner in females than in males. This has been brought out particularly clearly by Pryor's studies on carpal ossification where it was found that certain of the bones which appear rather late in childhood may be present a year or more earlier in the female than in the male. Apparently no study has been made to determine whether this precosity in development of the female exists in the intrauterine life. We have made an attempt to analyze our material from the standpoint of sex by

TABLE XI

COMPARATIVE FREQUENCY OF THE OSSIFICATION OF THE CENTERS OF THE WRIST, KNEE AND ANKLE IN FIRST-BORN AND LATER CHILDREN AT BIRTH

CENTER	MALES (52)				FEMALES (43)				BOTH SEXES	
	FIRST-BORN (39)		LATER CHILDREN (13)		FIRST-BORN (25)		LATER CHILDREN (18)		FIRST-BORN (64)	LATER CHILDREN (31)
	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT	PER CENT	PER CENT
Inferior femoral epiphysis	38	97.4	13	100	25	100	18	100	98.4	100
Superior tibial epiphysis	33	84.6	8	61.5	19	76.0	17	94.4	81.2	80.6
Cuboid	11	28.2	4	30.7	12	48.0	7	38.9	35.9	35.5
Os capitatum	4	10.2	4	30.7	5	20.0	1	5.6	14.0	16.1
Os hamatum	2	5.1	0	0	4	16.0	1	5.6	9.4	3.2

TABLE XII

TABLE SHOWING THE RELATIVE PERCENTAGE PRESENCE AND ABSENCE FREQUENCY OF THE OSSIFICATION OF THE SUPERIOR TIBIAL EPIPHYSIS, INFERIOR FEMORAL EPIPHYSIS, OS CUBOIDEUM, OS CAPITATUM, AND OS HAMATUM IN 100 NEWBORN CHILDREN

	OS HAMATUM PRESENT	OS HAMATUM ABSENT	OS CAPITATUM PRESENT	OS CAPITATUM ABSENT	CUBOID PRESENT	CUBOID ABSENT	SUP. TIBIAL EPI. PRESENT	SUP. TIBIAL EPI. ABSENT
Os capitatum present	9	6						
Os capitatum absent	0	85						
Cuboid present	9	29	13	25				
Cuboid absent	0	62	2	60				
Sup. tibial epi. present	9	72	15	66	36	45		
Sup. tibial epi. absent	0	19	0	19	2	17		
Int. femoral epi. present	9	89	15	83	37	61	81	17
Int. femoral epi. absent	0	2	0	2	1	1	0	2

grouping it in tables arranged on the basis of period of gestation as determined from the last menstruation, and on body-length. On the last basis we have also made a combined table including all the data of this kind available to us from the literature.

Due to the sources of error in calculating the length of gestation which have been pointed out in a preceding paragraph the analysis of sex differences in ossification based upon the menstrual age gives inconclusive results and on this basis alone no definite and consistent differences in sex could be determined.

The sexual differences in the frequency of ossification in material arranged according to body-length are shown in Tables VII, VIII, IX and X. Table VII shows that when specimens of the two sexes are arranged in groups of equal body-length the frequency of ossification of the various centers is distinctly greater in the females of all groups under 55 cm. than in males. It should be remembered, however, that newborn females average approximately 1 cm. less in total body-length than males and that therefore late female fetuses having the same length as males may be somewhat more mature. In Tables VIII, IX and X we have attempted to allow for this difference by making the range of body-length of the females 1 cm. lower in each group than the range of the males of the same group. If these tables are examined it will be noted that even with this correction the percentage frequency of ossification in the females is greater in the majority of instances than in males of the corresponding group. This higher percentage of ossification of the females is particularly noticeable in the shorter and younger groups and in those centers which are not ossified in all cases at birth.

RELATION OF OSSIFICATION TO PARITY

It is well known that both the average weight and the average total length of the newborn of multiparæ is somewhat greater than that of first-born children and this difference has been attributed to a supposed greater length of the prenatal period in the former. A priori one might expect to find this greater general development and (supposed) greater maturity accompanied by a more advanced skeletal development. Pryor (1908), however, in his studies on the postnatal ossification of the wrist, found that carpal ossification was more advanced in first-born than in subsequent children. We are certain of the parity of 95 of our cases of which 64 were primiparæ and 31 were multiparæ. The comparative frequency of the ossification centers in these two groups is shown in Table XI below. As will be seen from the examination of this table there are no consistent differences between the two classes with the exception of the os hamatum which was present in 9.4 per cent of the first born and only 3.2 per cent of the later born, and the small number of cases in which the os hamatum

occurs makes the significance of this difference quite open to question. In the latter 47.1 per cent of the greatest possible number of centers were present and in the former 47.8 per cent. While the absolute degree of ossification is practically the same in the two classes, it may be suggested that if the supposition is correct that children of multiparae have a longer period of gestation on the average than the children of primiparæ, then ossification is *relatively* more advanced in the latter class. This supposition would be in accord with the observations of Pryor cited above.

VARIATIONS AND IRREGULARITIES IN OSSIFICATION

Taken as a whole, ossification was extremely regular in our material. This falls in line with the experience of Pryor (1908) who has emphasized the regularity of postnatal ossification in the carpus, and with the findings of Pozier (1912) regarding the natal ossification of
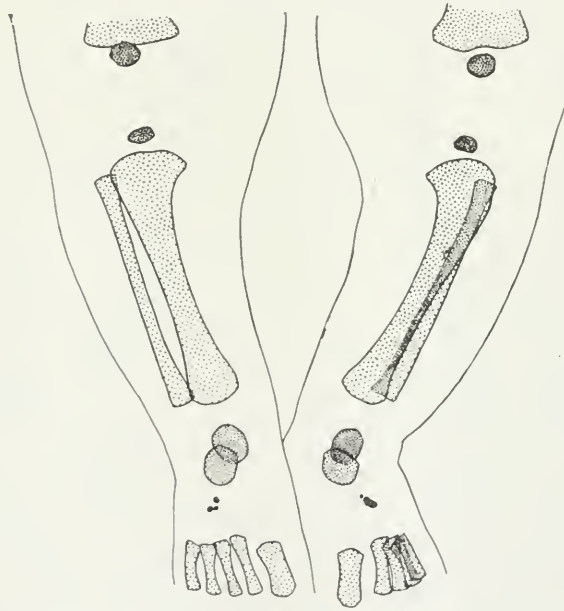
Fig. 6.—Tracing of a radiogram of the lower extremities of a male newborn of 309 days' gestation, having a birth weight of 5060 grams and a total length of 55 cm. Three centers for the cuboid on either side.

the knee. The most variable of the bones studied was the cuboid. This bone is generally described as ossifying from 2 to 3 centers. Hassel-wander (1909), who has made the most complete study of the ossification of the cuboid, found a single center 24 times in 47 cases, a double center 19 times (in which a possible third was indicated 4 times), and 3 definite centers in 4 cases. In our material the number of centers was much more variable, there being several cases in which 4 or 5 centers were present, and one instance in which 7 ossific granules could be

recognized. In the young bone the centers appear in the radiograph as a small cluster of minute particles, and the irregular form of this center in older specimens indicates the fusion of these masses which were originally discrete. Quite commonly two or three large centers may be observed for some time after ossification has been in progress, and often the bone has a bifid form in the radiograph. These peculiarities are illustrated in Figs. 6 to 14. We found not only the greatest irregularity in the number and shape of the centers in different specimens but also on the different sides of the same specimen. Examples of this asymmetry are shown in Figs. 7 and 8.
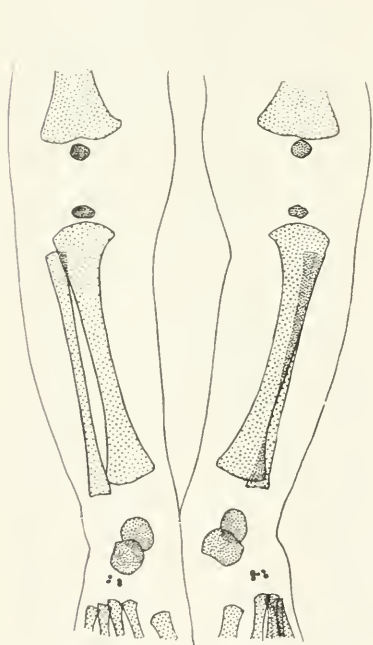
Fig. 7.—Tracing of a radiogram of the lower extremities of a female newborn of 277 days' gestation, having a birth weight of 2710 grams and a total length of 46 cm. Four centers of ossification in the right cuboid, 5 in the left.
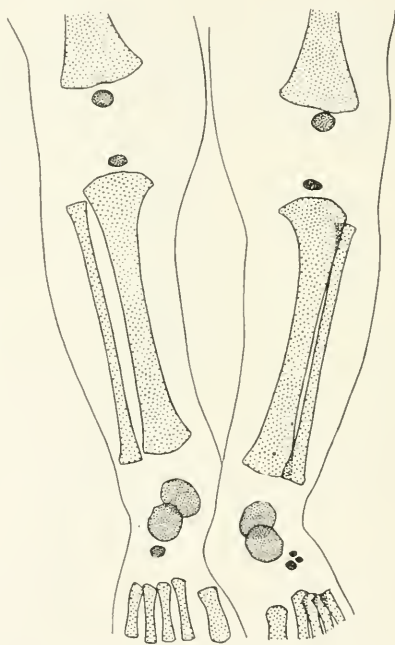
Fig. 8.—Tracing of a radiogram of the lower extremities of a female newborn of 294 days' gestation, having a birth weight of 3525 grams and a total length of 51 cm. One large cuboid center on the right and 3 centers of the cuboid on the left ankle. Knee centers small for a newborn child of this degree of development.

The os capitatum also showed some bilateral irregularity. It was present in three instances on the right side only and in three instances on the left side only. This disagrees with Pryor's finding that the ossification of the wrist is always symmetrical. The os capitatum was double in two cases and in one case it was bifid.

Table XII is arranged to show definitely the percentages of presence and absence of the different ossific centers and to visualize the occurrence and nonoccurrence of each of the centers in relation to the others in the series. This table shows that the inferior femoral center was the one most
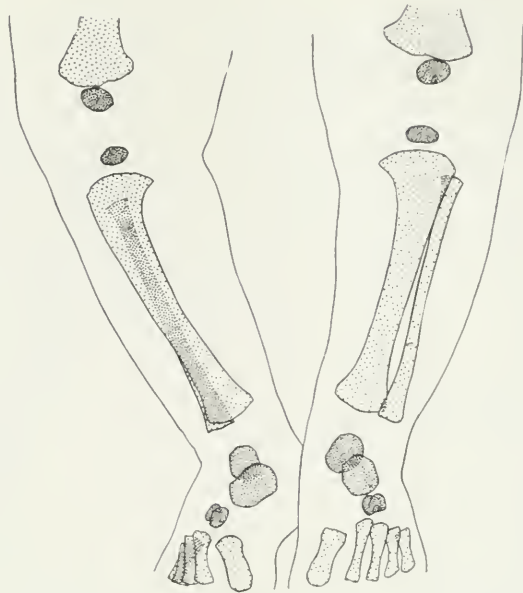
Fig. 9.—Tracing of a radiogram of the lower extremities of a female newborn of 289 days' gestation, having a birth weight of 4155 grams and a total length of 51.5 cm. Large bifed centers of the cuboid on both sides.
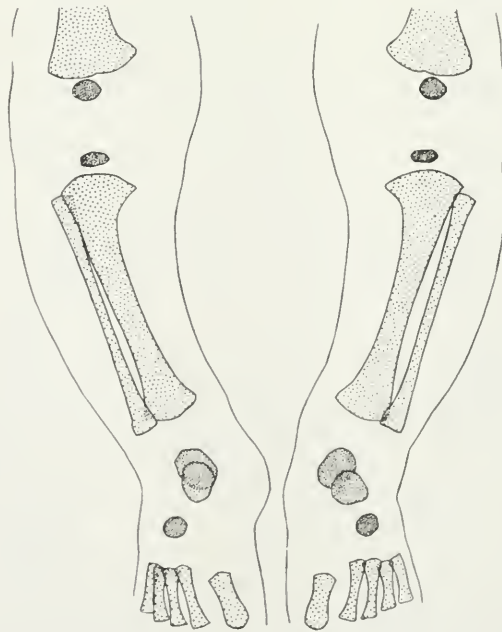
Fig. 10.—Tracing of a radiogram of the lower extremities of male infant of 267 days' gestation, having a birth weight of 4225 grams and a total length of 55 cm. Large single center of the cuboid of both sides.
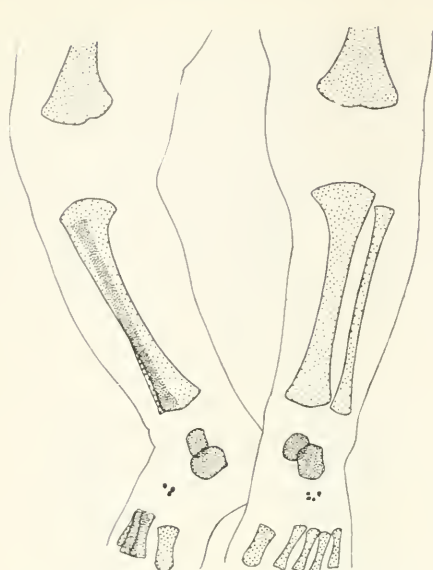
Fig. 11.—Tracing of a radiogram of the lower extremities of a female newborn of 281 days' gestation, having a birth weight of 2185 grams and a total length of 43 cm. No knee centers, but cuboid centers on either side despite a low body weight and body length.
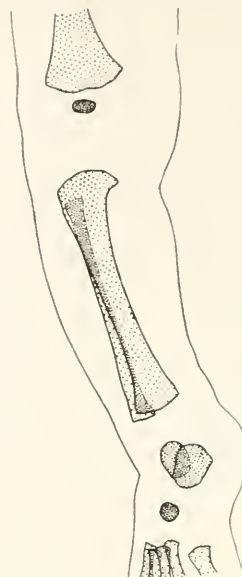
Fig. 12.—Tracing of a radiogram of the right leg of a male newborn of 265 days' gestation, having a birth weight of 3035 grams and a total length of 51 cm. No superior tibial center but a large single cuboid center.
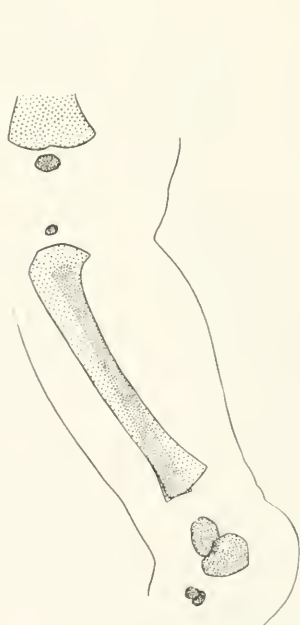
Fig. 13.—Tracing of a radiogram of the right leg of a male newborn of 285 days' gestation, having a birth weight of 4295 grams and a total length of 55 cm. Newborn of unusually large dimensions with relatively small knee centers but highly developed bifid cuboid center.
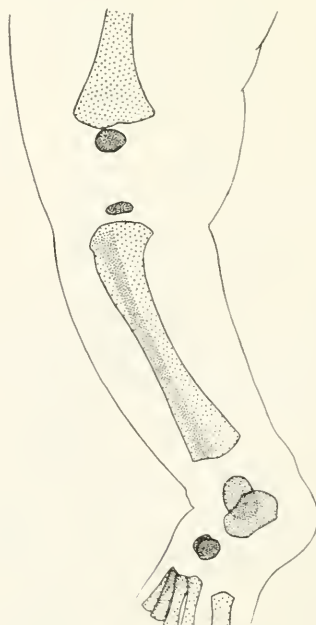
Fig. 14.—Tracing of a radiogram of the right leg of a female newborn of 292 days' gestation, having a birth weight of 4110 grams and a total length of 51.5 cm. Specimen of great weight with advanced development of knee and cuboid centers, the latter being double.

constantly present, being found in 98 of the 100 cases. The other centers were present with varying frequency in association with the inferior femoral, as follows: Superior tibial in 81; cuboid in 37; os capitatum in 15 and os hamatum in 9 of the 98 cases in which the inferior femoral was present. These same centers were absent in a considerable number of those cases in which the inferior femoral was present, as may be seen from the following figures: the superior tibial was absent in 17, the cuboid in 61, the os capitatum in 83, and the os hamatum in 89 of the 98 instances in which the inferior femoral was present. With the exception of the occurrence of the cuboid in one case the other centers were uniformly absent when the inferior femoral epiphysis was not ossified.
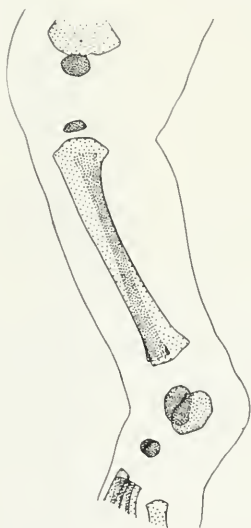
Fig. 15.—Tracing of a radiogram of the right leg of a female newborn of 312 days' gestation, having a birth weight of 3090 grams and a total length of 48 cm.

Fig. 16.—Tracing of a radiogram of the left leg of a male newborn of 287 days' gestation, having a birth weight of 3600 grams and a total length of 53.5 cm. A specimen of more than the usual newborn dimensions with no ossification of the cuboid or superior tibial epiphysis.

The superior tibial center was present in 81 cases in which the inferior femoral was constantly present, and the cuboid, capitatum and hamatum occurred 36, 15, and 9 times respectively. This center was absent in 19 cases of the series. In these the inferior femoral occurred in 17 and the cuboid in only 2, and no wrist centers were present. The presence of the cuboid in the absence of the superior tibial epiphysis may be regarded as quite unusual.

The cuboid center appeared 38 times. In these the centers of the inferior femoral, superior tibial, os capitatum and os hamatum were present in the following number of cases: 37, 36, 13, 9. It was never the only

center present but was one of only two centers in one instance.
The cuboid was absent from 62 cases and in these the inferior
femoral was present in 65, the superior tibial in 45, the capitatum in
2 while the hamatum was always absent. The inferior femoral was
absent in 1, the superior tibial in 17, the capitatum in 60 and the hama-
tum in all of the instances (62) where the cuboid was absent.
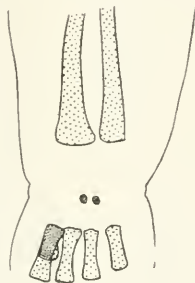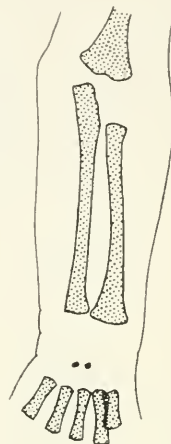
Fig. 17.   Fig. 18.   Fig. 19.
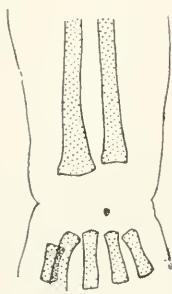
Fig. 20.   Fig. 21.   Fig. 22.

Fig. 17.—Tracing of a radiogram of the wrist of a female newborn of 287 days' gestation
having a birth weight of 3390 grams and a total length of 53 cm. Os capitatum and os hamatum
present.

Fig. 18.—Tracing of a radiogram of the wrist and forearm of a male newborn of 309 days'
gestation, having a birth weight of 5060 grams and a total length of 55 cm. An unusually large
child with the centers for the os capitatum and os hamatum highly developed.

Fig. 19.—Tracing of a radiogram of the wrist and forearm of a female newborn of 277 days'
gestation, having a birth weight of 2710 grams and a total length of 46 cm. Os hamatum and os
capitatum.

Fig. 20.—Tracing of a radiogram of the wrist of a female newborn of 312 days' gestation,
having a birth weight of 3090 grams and a total length of 48 cm. A small child with large os
hamatum and (double) os capitatum.

Fig. 21.—Tracing of a radiogram of the wrist of a female newborn of 289 days' gestation,
having a birth weight of 4165 grams and a total length of 51.5 cm. Os capitatum alone present.

Fig. 22.—Tracing of a radiogram of the wrist and forearm of a male newborn of 285 days'
gestation, having a birth weight of 4295 grams and a total length of 55 cm. Os hamatum and os
capitatum.

The center of the os capitatum was in evidence in 15 cases, in all of which the inferior femoral and the superior tibial centers were present. The cuboid appeared in 12 and the hamatum in 9 of the cases. All of the other centers were present in all of these instances. The os capitatum was seen in no case when the inferior femoral or superior tibial were absent but its presence was noted twice in the absence of the cuboid (which may be considered as somewhat anomalous) and it was present in 6 instances where the hamatum was absent.

Fig. 23.   Fig. 24.   Fig. 25.

Fig. 23.—Tracing of a radiogram of the wrist and forearm of a female newborn of 281 days' gestation, having a birth weight of 3950 grams and a total length of 49 cm. Usually large centers of the os hamatum and os capitatum.

Fig. 24.—Tracing of a radiogram of the wrist and forearm of a female newborn of 292 days' gestation, having a birth weight of 4110 grams and a total length of 51.5 cm. Large os hamatum and os capitatum.

Fig. 25.—Tracing of a radiogram of the wrist and forearm of a male newborn of 267 days' gestation, having a birth weight of 4225 grams and a total length of 55 cm. Os hamatum and (double) os capitatum.

The os hamatum was demonstrable in 9 of our series of cases. All of the other centers were present in every one of these. It was absent in 91 cases, the inferior femoral center was present in all of these, the superior tibial in 81, the cuboid in 38 and the capitatum in 15.

SUMMARY

1. The inferior femoral epiphysis, judging from all available data, is present in about 1 case in 20 in the eighth fetal month, in 1 case in 3 in the ninth month, in 6 cases in 7 in the tenth month, and in about 19 cases in 20 at birth (full-term infants). If not present at birth, the center appears before the close of the first postnatal month. In our own series the center was present in 98 per cent of all newborn children.

2. The superior tibial epiphysis, judging from all available material, is almost never present before the ninth fetal month. It is found in 1 case in 17 in the ninth month, about 2 cases in 5 in the tenth month

and in about seven-eights of all full-term newborn children. It was present in 81 per cent of the cases in our series.

3. The cuboid, according to all available data, first appears at about the beginning of the ninth fetal month. It is present, on the average,
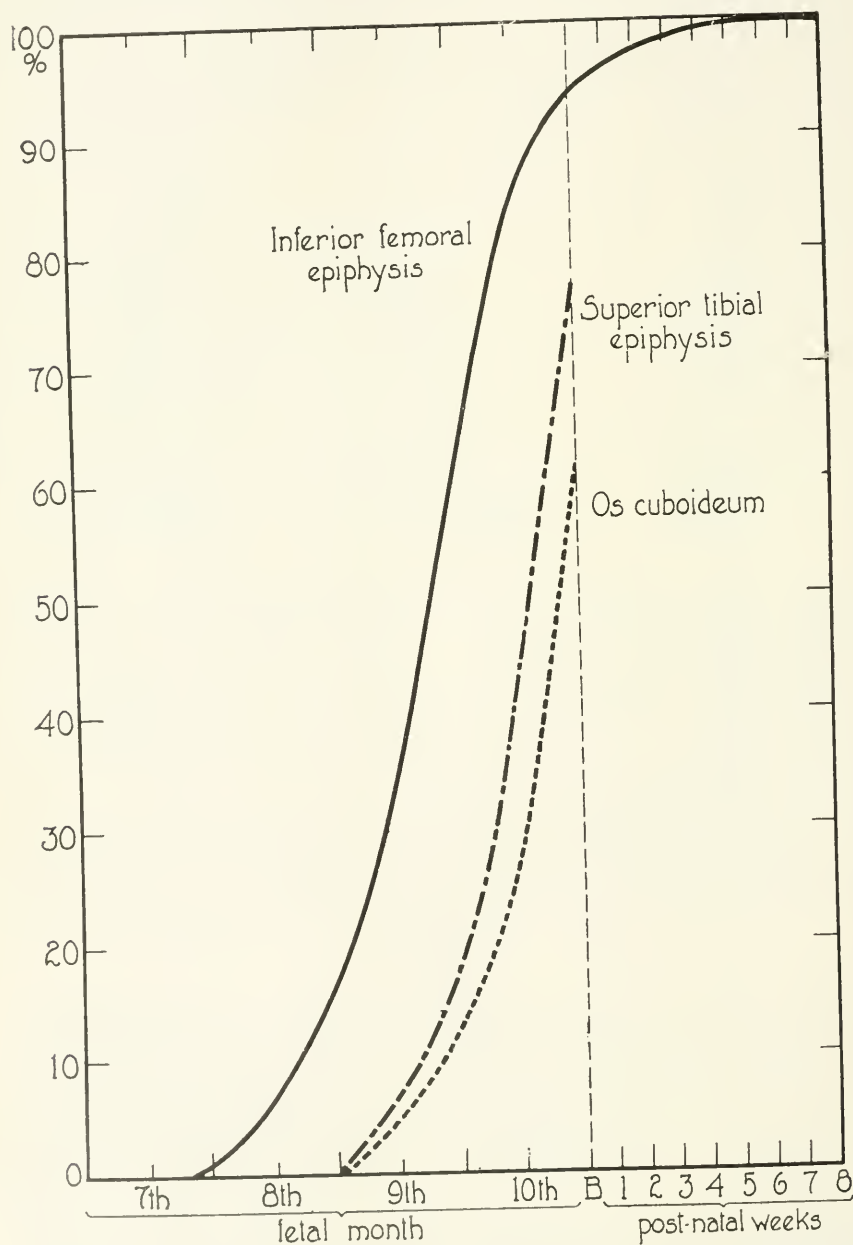
Fig. 26.—Graphs illustrating the frequency of ossification of the inferior femoral epiphysis, the superior tibial epiphysis and the os cuboideum in later fetal life. Abscissae, age. Ordinates, frequency of ossification in per cent. (Based on the material presented in Tables I, II, and III.)

in about 1 case in 25 in the ninth month, in about 1 case in 4 in the tenth month, and in about 3 cases in 5 in full-term newborn children. In our own series the center was present in a much smaller per cent of all cases than is reported by other investigators (38 per cent).

4. Two carpal ossification centers, those of the os capitatum (os magnum) and of the os hamatum (unciform), may be present in the newborn. In our series the os capitatum was present in 15 per cent and the os hamatum in 9 per cent of all cases.

5. There is a close relation between total body-length and frequency of ossification of the several centers discussed in this paper. A similar, but less close, correlation exists between frequency of ossification and the body-weight.

6. In our material the correlation of body-weight, total body-length and frequency of ossification with menstrual age was quite close for the middle members of the series ranging in menstrual age from 270 to 300 days. But the outlying cases (having a menstrual age of less than 270 or more than 300 days) show little relation between these measures of bodily development and age as determined from the menstrual history.

7. Our evidence points to the conclusion that ossification proceeds slightly more rapidly in females than in males during intrauterine life even though the weight and dimensions of the females are less than those of the males.

8. Our observations show no direct evidence of any relation between parity and the rate of ossification in intrauterine life.

9. Variations in the *number* of ossification centers present for individual bones were limited to the os capitatum and os cuboideum. The latter is formed from an extremely variable number of centers. When anomalies in the number of centers are present they are often asymmetrical.

10. Variations in the order of appearance of centers were decidedly unusual in our material, being confined to premature ossification of the os cuboideum (2 cases) and of the premature ossification os capitatum (2 cases).

11. The usual order of appearance of the centers under consideration is as follows: (a) Inferior femoral epiphysis; (b) Superior tibial epiphysis; (c) Cuboid; (d) Os capitatum; (e) Os hamatum.

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THE ADMINISTRATION OF PITUITRIN AT THE BEGINNING OF THE THIRD STAGE OF LABOR*

WITH A REPORT OF ONE HUNDRED CASES

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THE third stage of labor has always been a matter of concern to the obstetrician. He knows that at any time during this period, hemorrhage may occur. It may appear in any kind of labor, even in the easiest and apparently the most normal. And unless the obstetrician is prepared to meet and check this hemorrhage promptly, it may lead to most serious consequences. Aside from deep tears of the cervix, fibroids of the uterus, or abnormalities of the placenta such as placenta previa and accidental hemorrhages, hemorrhage occurring in the third stage of labor is due mostly to relaxation of the uterus. This relaxation is more apt to occur in a uterus exhausted by difficult or prolonged labor, but may occur in almost any kind of labor.

It is knowledge of this possibility of hemorrhage that makes the conscientious obstetrician apprehensive during the third stage of labor, and causes him to be on the alert, till the placenta is safely and completely expelled, and the uterus has firmly contracted, with no sign of bleeding. Even then the obstetrician cannot safely relax his vigilence, for it is possible that softening of the uterus may occur after labor, with consequent hemorrhage, unless measures are taken to guard against it.

Several methods are in use for preventing hemorrhage during the third stage of labor and for insuring the complete expulsion of the placenta.

1. The fundus is left entirely alone and untouched, and after a certain time, the placenta is expressed by Credé. This method is mentioned only to be condemned, for it seems too uncertain and haphazard. It is true that in many cases the uterus if left alone will behave perfectly, but it is also true that in many other cases it will not. Instead it will balloon up and partially fill with blood, and thus needless and even serious hemorrhage may occur.

2. The obstetrician looks after the fundus himself. Putting his hand on the patient's abdomen after birth of the baby, he locates the fundus through a sterile towel, and by holding it and gently tickling it with his finger tips when it starts to relax, he can keep it well contracted and prevent hemorrhage. Finally, at the appropriate time, usually in from ten to twenty minutes, he can cause the expulsion of the pla-

centa by using Credé's maneuver. Some fundi are harder to control
than others, but usually there is little difficulty in following this
method.

Unfortunately, the obstetrician cannot often use this method, for the
newborn child claims his attention. He must see that it cries well.
He must tie and cut and dress the cord and attend to the baby's eyes.
These duties may be delegated to an assistant, but they are of so
great importance that the obstetrician usually feels obligated to at-
tend to them himself. Therefore, the third method is more often used.

3. The obstetrician feels the fundus from time to time, as he is able,
through a sterile towel, and for the rest of the time, until he has at-
tended to the baby, he intrusts the care of the uterus to a nurse or an
assistant.

This method is not entirely satisfactory, for it is an unfortunate fact
that very few nurses know how to hold a fundus in the third stage
of labor. And even of the doctors themselves many are almost equally
ignorant. So that unless an assistant is especially trained in obstetrics
his help is not much more valuable than that of the nurse. To me it
is one of the greatest comforts to have an assistant who knows how
to hold a fundus skillfully. Such an assistant is not always available,
and the obstetrician is thus obliged to depend on the nurse.

Except for a few, who have had unusual experience, practically all
nurses show the following faults when trying to hold the fundus.

They fail to locate the fundus at all, and spend their time holding
on to, or actively massaging the patient's abdominal wall, while the
fundus is riding above their hand entirely untouched. Or, if they
do locate the fundus at first, they lose it as soon as it softens and re-
laxes, a time when it especially needs attention to prevent hemorrhage.
Again, when the fundus is hard and well contracted, it is easy to feel,
and then in spite of being cautioned, they persist in vigorously rubbing
and prodding it. This tends to cause premature and incomplete sepa-
ration of the placenta with bleeding. Thus they fail to stimulate
the softening fundus, and they overstimulate the hard, well contracted
fundus. All this tends to produce unnecessary hemorrhage.

4. The use of ergot in the third stage of labor. This seems to be
of little advantage and even dangerous. In the first place, ergot is
slow in action, usually not before twenty or thirty minutes, by which
time the third stage is often over. In the second place, ergot causes
a tonic or continuous contraction of the uterine muscle, so that if it
happens to act before the placenta is expelled, the uterus may clamp
down tight on it, holding it imprisoned, and making its expulsion
difficult, even forming the dreaded hour-glass contraction.

It is a safe rule that ergot should never be used until the uterus is
empty.

5. The use of pituitrin, pituitary extract, or infundibulum, as it is

variously called, in the third stage of labor. This drug in small doses seems to act on the uterus to produce not tonic contraction as does ergot, but clonic contraction, contraction followed by relaxation. Thus it may be safely used, unlike ergot, on a uterus which is not empty. Moreover, its action is much more rapid than that of ergot. When given hypodermatically it usually acts in from two to seven minutes, but continues its action only twenty or thirty minutes.

For years it has been my routine to have a hypodermic syringe filled with 1 c.c. of pituitrin, ready during the third stage of labor. On the first sign of undue hemorrhage or relaxation of the uterus, this dose is given hypodermatically, and shortly after when the uterus is felt to contract firmly, the placenta is expressed by Credé's maneuver. Usually, this is quite easily accomplished. If the third stage is normal, the pituitrin is given immediately after the complete expulsion of the placenta. This is followed by a dram of ergotole by mouth. The idea is that the pituitrin causes a quick contraction of the uterus, and as its action begins to wear off in about twenty or thirty minutes, that of the ergot begins and continues. This method has proved quite satisfactory. However, it does not do away with the necessity of having the fundus constantly watched during the third stage by a nurse or doctor.

Many observers have reported good results from the administration of pituitrin at the beginning of the third stage of labor, as a routine, claiming that the management of this stage was thus made easier, and the satisfactory expulsion of the placenta was made surer.

With a view to testing this method, it was tried on one hundred ward patients at the Sloane Hospital for Women this summer. This was with the permission of Dr. Caldwell, in charge of the summer service, and of Dr. Studdiford, Director of Obstetrics in the Hospital. The work was done under the direct supervision of Dr. Caverly, one of the Assistant Resident Obstetricians, and with the help of the Interne Staff.

Irrespective of the kind of labor, or of the condition of the patient, each woman at the beginning of the third stage was given 1 c.c. of Burroughs Wellcome preparation of pituitrin by hypodermic injection. The fundus was then held for twenty minutes by student, doctor, or nurse, unless the placenta was expelled spontaneously before that time. No attempt was made to express it sooner than this, however. If the fundus showed signs of softening unduly, it was gently stimulated.

Of these 100 cases then, all had 1 c.c. of pituitrin at the beginning of the third stage.

Eighty-six were normal vertex deliveries; 8 were forceps deliveries; 5 were breech deliveries; and one was a multiple birth, twins.

Eighty had no medication (pituitrin or ergot) after labor, and showed no need of it.

Twenty had either pituitrin or ergot after labor, because they *did* show need of it.

In 25 the placenta was expelled spontaneously before 20 minutes.

In 75 it was expressed by Credé at the end of 20 minutes; in 74 with slight pressure; and in 1 with strong pressure, at the end of 60 minutes under ether, after three unsuccessful attempts previously without ether.

All of the 100 placentæ came away complete. None needed manual extraction.

The average time of placental delivery was 18.2 minutes. The shortest time was 5 minutes spontaneous. The longest was 60 minutes by Credé under ether, being the only delivery delayed over 20 minutes. The time of delivery is partly arbitrary, however. For a deliberate attempt was always made to wait 20 minutes. In many the placentæ could seemingly have been expressed in less time easily.

There was no hemorrhage of the first degree, that is of 16 ounces, or over. The average amount was estimated at 5.9 ounces.

After labor the fundus was observed to remain hard in 93 of the 100 cases for one hour; in 6 it hardened and softened alternately during that time; and in 1 it remained soft persistently till pituitrin and ergot were given.

In the 19 other cases where pituitrin or ergot was given postpartum, it was given for slight bleeding only.

Seventy-four of the 100 cases during the puerperium had no temperature at any time of 100° F. or over; 26 *did* have temperature at some time of 100° F. or over, 16 of these due probably to uterine causes, and the rest to causes entirely outside of the birth canal.

For comparison with this series of 100 cases, which we may call the pituitrin series, 100 other labors were observed in which pituitrin was *not* given at the beginning of the third stage of labor.

Eighty-eight of these were normal vertex deliveries; 8 were forceps deliveries; and 4 were breech deliveries.

Forty-five needed pituitrin or ergot postpartum, as against 20 in the pituitrin series.

None of the placentæ were expelled spontaneously, as against 25 in the pituitrin series.

Ninety-eight placentæ were expressed by Credé easily, as against 74 easily and 1 with difficulty in the pituitrin series.

Two placentæ were extracted manually, both after 60 minutes and after three attempts at Credé without ether and one with ether; none needed manual extraction in the pituitrin series.

The length of the third stage of labor averaged 17.5 minutes, as against 18.2 minutes in the pituitrin series. This observation is of

little value, as in the pituitrin series a deliberate attempt was made to wait 20 minutes, while in the nonpituitrin series no such attempt was made. However, this effort to express the placenta before 20 minutes, gave less chance of its spontaneous expulsion, and might partly account also for the greater hemorrhage in the nonpituitrin series.

The hemorrhage was slightly greater in the nonpituitrin series, an average of 8.2 ounces, as against 5.9 ounces in the pituitrin series.

In the puerperium 60 had no temperature at any time of 100° F. or over, as against 74 in the pituitrin series; and 40 did have temperatures at some time of 100° F. or over, as against 26 in the pituitrin series; 36 of these were due possibly to uterine causes, as against 16 in the pituitrin series.

Following this series, the writer tried the administration of pituitrin at the beginning of the third stage of labor, on 7 of his own private patients.

Six were multiparæ, all with normal vertex deliveries, all with short labors, one of 8 hours and the others all under 5 hours each. One was a primipara, with a forceps delivery and a 10½ hour labor.

The length of the third stage was 26 minutes, 23 minutes, and 15 minutes, respectively, for 3; and 20 minutes for each of the others.

The amount of hemorrhage was as follows: 2 had 10 ounces each; 2 had 8 ounces each; 2 had 6 ounces each; and 1 had 7 ounces. An average of 7.8 ounces.

In the first 5 the fundus contracted promptly within five minutes after giving the pituitrin, and remained so, without tendency to soften or enlarge. At the end of fifteen or twenty minutes, with slight pressure on the fundus, the placenta was expressed easily, and complete. In one of these cases the cervix shut down on the trailing-after membranes, but with a little delay they came away complete.

In the last two, when the placenta was expressed, clots were inside of the membranes. In one there was a hard clot weighing about 8 ounces. There was practically no other bleeding before or after expulsion of the placenta. In the other, with the birth of the placenta, about 8 ounces of bright clotted blood was found in the membranes, and further pressure on the fundus expressed 2 more ounces of clots. In this case, the fundus remained hard throughout the third stage, but was rather high, and the bleeding seemed to be into the membranes already partly expelled into the vagina. It seems probable that in each of these two cases earlier expression of the placenta might have prevented this hemorrhage.

All of these seven cases received as a routine 1 dram of ergotole after labor.

CONCLUSIONS

The series is too small to allow of definite deductions, but in so far as it goes, we may draw the following conclusions concerning the

administration of pituitrin at the beginning of the third stage of labor.

1. It is a safe procedure. In none of the 100 cases was there any bad effect apparent.

2. It tends to cause spontaneous expulsion of the placenta. This occurred in 25 of the 100 ward cases; in none of the private cases.

3. It tends to lessen the amount of blood lost. The average amount of hemorrhage per patient was $2\frac{1}{3}$ ounces less in the pituitrin series than in the nonpituitrin series. (For the 100 patients a total saving of nearly 2 gallons of blood!)

4. It makes guarding of the fundus during the third stage easier. Little stimulation of the fundus is necessary to keep it contracted.

5. It does not do away with the necessity of watching or holding the fundus. It is not sufficient that the fundus remains well contracted. It must be kept from riding high, otherwise unobserved bleeding may occur into the membranes already partly expelled into the vagina.

6. It is probably better not to wait twenty minutes as a routine before trying to express the placenta, as was done in this series. The attempt can often be made earlier with advantage, but should not be persisted in if expression is at all difficult.

7. The method is worthy of further study and consideration.

However, whether pituitrin is given at the beginning of the third stage of labor, or later, or not at all, it has been shown to be an efficient means of quickly checking hemorrhage. And, therefore, it should be at hand, in a hypodermic syringe, ready for instant use, during and after the third stage of every labor. This should be a part of the equipment of every modern obstetrician.

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THE LEAST COMMON MULTIPLE IN OBSTETRICS*

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TO THE obstetrician and the practitioner interested in obstetrics nothing is more surprising than the attention paid by the general public to anything which tends to the abnormal in the management of what should be a natural process. Extensive advertisement, for example, of twilight sleep or other painless methods of childbirth go together with the remarkable attention attracted by labor as conducted in Rochester or Chicago. Yet the reason for this is not especially remarkable when we consider that the childbearing population, particularly that portion of it which by leisure is enabled to take interest in various social duties and indulge the common fondness for current fiction, may view these incidents as depicted by that friend of idle hours—the modern novelist. A later generation than readers of Tolstoi and Zola may take up the works of such novelists as Stephen McKenna, W. L. George, or John Galsworthy, and be struck by the peculiar ideas of these men regarding childbirth or perhaps by their ignorance of the work of the average obstetrician. For example, in "Sonia," O'Rane starts with a special halo of romance because his mother died giving him birth. In "Caliban" the whole life history of the hero is to a certain extent altered and his domestic arrangements completely upset because the long awaited child died during or just after its birth. True, these are more or less minor instances, but in "In Chancery," Galsworthy's latest book, we have the same old story of the husband tortured by the necessity for decision as to whether the mother or the child shall be saved—the same old dictum that another child would kill the mother: "If I don't operate, the baby will be born alive. It's a great risk for the mother." If these are not sufficiently classic, it may be well to remember the death of Mrs. Farfrae in Thomas Hardy's "Mayor of Castorbridge"—a fright, premature labor, and sudden death. If you object that these are English views, one may refer to Lewis's "Main Street," that much discussed American novel, in which the process of having children is depicted in a way anything but cheerful.

Now, if we take these views as those ordinarily accepted by the laity, it may be suggested that the average woman enters upon pregnancy not only with a dread of the outcome for herself and baby, but with the practical assurance that, even should both survive, the ordeal will be a terrible one. Is this point of view justifiable? At this very minute I have before me pamphlets of the Metropolitan Life Insur-

ance Society of this city, noting the remarkable increase in maternal death during labor and asking for comment thereon.

Is it not time that we should take counsel together, with a view to improving our work, if at all possible, and placing before the public the results of the proper handling of maternity cases, the infrequency of maternal death, and the relative unimportance of childbirth as a cause of maternal death, when there has been sufficient prenatal care?

My warrant for bringing this matter before this Academy is not only the satisfactory record of the Montreal Maternity in these matters, but the debt that we feel we owe to the obstetricians of New York in placing in the hands of the profession methods tending to greater simplicity in treatment, which have resulted in a remarkable improvement in our results.

The lengthy participation in war has accounted for a marked decrease in the amount of constructive work in the various departments of medicine, but at the same time has resulted in an almost complete readjustment of methods in some departments, for two reasons: (1) the exaggerated cost of many medicines and chemicals, notably alcohol; and (2) the appreciation of the fact that, during the war, success in treatment depended upon simplicity and immediate employment, rather than on undue complication. The methods in use in the Montreal Maternity today are simpler than at any time since that institution was opened, and the results are, so far as I can classify them, better than at any period since that date.

That this should be so in the department of obstetrics is very gratifying for the reason that, though trained in a school which prided itself on giving students instruction which would make them competent obstetricians wherever that specialty was called into play, I heard during my postgraduate days nothing but the plea that there was house obstetrics as opposed to hospital obstetrics, and that a man might be a competent hospital obstetrician only if qualified to undertake treatment which would not be adapted to household use. It is obvious that this point of view militated greatly against the satisfactory training of students in one of the most important branches of the profession, and it is gratifying to note that any changes made in the direction of simplicity have been measures adapted to everyday use by the general practitioner.

To a consideration of a simple routine the smallest possible combination of all that is best, the least common multiple of methods; I would ask your indulgence for a few moments. While dealing especially with factors involved in the conduct of labor and in the puerperium it will perhaps be more satisfactory to consider as well the management of pregnancy.

Maternity is a test of function, and pregnancy should be a perfectly normal state for a normal woman. Beyond the injunction to drink

plenty of water, to be sure that there is a daily evacuation of the bowel, and to massage the nipples in order to facilitate nursing, little advice is necessary. Apart from the relatively frequent examination of the urine, in which the two most important factors are the presence of albumin and the appearance of pus cells, we believe that the best thing to do is to let the patient alone as much as possible until within the last month. Why they should not ride, golf, or swim, I have never been able to understand, and, apart from being told to be careful at such times as menstruation would take place, were they not pregnant, they are allowed every freedom.

The three chief complications of pregnancy from the practitioner's point of view, are, of course, vomiting, toxemia, and pyelitis.

<center>VOMITING</center>

Following the experimental work of Dr. Whitridge Williams and of Ewing and Stone, a great deal was written about the pernicious vomiting of pregnancy. My own belief is that clinically there is no such entity. That to severe vomiting early in pregnancy there are sometimes added the toxic results of acute starvation is not remarkable, but in twenty years I have seen no more than five cases where the emptying of the uterus was necessary or justifiable, and, though the most recent is now some years gone by, I am not certain that even this, had it been treated from the start of the pregnancy, would have required the termination of the pregnancy.

Two recent theories regarding morning sickness are (1) a possible ovarian insufficiency; and (2) an alteration in the circulation of the brain when the patient assumes an upright position. As said before, the onset of toxic symptoms with the vomiting implies starvation. The prevention of starvation is therefore the object of any treatment. We have found that, even where vomiting had assumed rather serious proportions, it has always been possible to prevent starvation by the administration of such foods as are not easily vomited; and a great many patients have found early relief when placed on a diet of nuts, raisins, and milk chocolate, substances which can be carried easily in the pocket and taken in place of regular meals.

Years ago a sailor suggested to me as preventive treatment for seasickness the wearing of a tight band about the neck and eating dry stuffs which were not easily rejected. Both of these suggestions I have had occasion to put into practice with the most satisfactory effect, and only recently, after hearing a dissertation on the postural factor in morning sickness, the sound nature of the physiology of the treatment impressed itself upon me, notably the passive congestion induced by a band about the neck before the patient left her bed. Both of these measures have given remarkably good results. It may be objected that they are simply methods of suggestion. Perhaps so.

The addition of hypodermic injections of corpus luteum extract can do no harm and has a therapeutic basis.

PYELITIS

Among the complications of pregnancy pyelitis has become much more prominent than formerly. Whether from being more readily recognized or not, the fact remains that we have had in the hospital in the past year as many of these cases as would formerly have been admitted in five years. The surprising thing is that so few are recognized outside the hospital. One reason for this would appear to be the frequent absence of pus from the urine at the time of maximum severity of symptoms. An irregular typhoid-like temperature with indeed few definite symptoms apart from malaise and practically no signs other than the characteristic pain elicited by pressure in the right costovertebral angle and possibly a few pus cells in the urine, may be associated with a very extensive infection of the upper urinary tract. In a number of these cases, in which the ureters were catheterized, the obstruction to the ureter was found very slightly above its opening into the bladder, and was apparently due to the well recognized torsion of the uterus. The occasional appearance of blood in the urine after even the most careful catheterization has led us to avoid catheterization wherever possible, and by posture of the patient and large doses of urotropin, together with forced fluids, to carry her through to term, or, if in spite of treatment the condition becomes aggravated and there are recurring chills, to have no hesitation in emptying the uterus, preferably by vaginal section.

NEPHRITIS

We have been able to do very little with nephritic toxemia. Personally I do not believe that eclampsia often occurs without definite prodromal symptoms, but those cases of pregnancy in a patient with a latent nephritis, often the result of scarlet fever, offer great difficulty, and my own impression is that the first pregnancy is usually the only one which offers any possibility of successful termination. By careful watching, it should be possible to determine time for induction of labor before the destruction of the placenta by infarction, but sudden death of the child by an accidental hemorrhage, another complication of such toxemias, is almost impossible to foretell. There can be no doubt that the effect of a pregnancy on a damaged kidney is to damage that organ still further, and, while I have seen repeated attempts to secure a live child, I have never yet seen one that was successful. In neither of these cases, however, is it a question of immediate life or death for the mother.

LABOR

In discussing the management of labor, the pelvis is, of course, a most important factor, but the present division of pelves into normal and contracted leads, I believe, to many unnecessary difficulties. Might I suggest that pelves, even when normal, may be disproportionate, and that so-called contracted pelves are only an obstruction to labor if disproportionate to the size and shape of the child which is to pass through the canal. Exact pelvimetry is not a substitute for antepartum examination of presentation and position and careful watching of the patient in the second stage. This has been brought home to us very forcibly in certain instances, where the pelvic measurements were apparently absolutely normal and yet there was extreme difficulty in birth, owing to the large size of the child, which had evidently gone beyond term. So too in pelves with contracted outlets. I have seen a number of cases where a cesarean section was done on account of the close approximation of the tuberosities of the ischium, but I have seen but one case where the contraction of the pelvic outlet offered resistance to the passage of the head when a test of labor was given. It is perfectly true that, when the bi-ischial diameter falls below 8.5 cm., the birth will be abnormal. Here, the biparietal diameter of an average head must lie behind the bi-ischial line; and, if a forceps is applied, the entire instrument must lie posterior to the attachments of the transversus perineii muscle. A realization of the danger of extensive damage to the soft parts, together with the relative certainty that the head can pass the pelvis, indicates either deep episiotomy as a preliminary to a spontaneous birth of the head or the application of forceps, with the distinct understanding that a laceration involving the rectum is almost inevitable. The ability to repair satisfactorily such laceration, however extensive, is, I believe, the hall mark of a competent obstetrician.

The question of operative interference during labor is a very broad one and may be viewed from many angles. My own belief is that the obstetric history of any woman depends directly upon the management of the first labor, and that in cases of moderate disproportion, overstretching of the abdominal muscles in a prolonged second stage is an extremely important factor in the production of dystocia in later labors. I do not believe that version,—admirable operation that it is,— is desirable in a primipara, and in a multipara I believe it is always attended with the grave risk of extensive laceration of the cervix. On the other hand, when the head is arrested in the pelvis and the force exerted by the abdominal muscles seems insufficient to cause the head to advance, my suggestion would be that operation should be performed when it is believed that the moment has arrived when the *reparable* damage that may result from the operation is less than that which will result from allowing the labor to proceed normally. And

I would again insist that the gravest danger in the labor of any primipara is an overstretching of the recti muscles with resultant increased dystocia in subsequent labors.

To consider now the more important features in connection with the management of labor, it may be remembered that the causes of death are most closely associated with two complications, infection and hemorrhage. The frequency of puerperal infection can only be gauged by general morbidity statistics, and it is because, as I have previously said, our morbidity statistics have improved so markedly in the last few years, that I wish to bring before you tonight three factors in the management of labor: (1) rectal examination; (2) median episiotomy; and (3) absolute discontinuance of any medication after the delivery of the child. Rectal examination you know; median episiotomy Pomeroy has made known to you; and the discontinuance of purgation has been advocated by Ross McPherson and others, but to this we have added a further simplification—the discontinuance of such an old stand-by as ergot. These three measures are not important in themselves alone, but in their effect upon the general conduct of labor. For example, a patient who is not to have a purgative during the puerperium, receives on admission to hospital a dose of castor oil and an enema. The enema is not given to facilitate the passage of the head into the pelvis, as was the old idea, but to empty the bowel more or less completely. The median episiotomy allows an easy repair, and the repair can be done while waiting for the separation of the placenta. The nonmassage of the uterus allows a more regular and uniform contraction than where it is held or massaged. As a result the placenta separates more easily and there is no tendency, by forcing the organ with the membranes protruding from the cervix into the vagina, to smear the organisms from the posterior fornix and vagina over the cervix when the placenta eventually separates. The tying of the sutures of the episiotomy is an extremely easy matter. The placenta is allowed only time to separate, the patient regaining consciousness and expelling it by her own efforts. The sutures are then tied and the fundus watched. It is true that a certain amount of clot may form in the cavity, but at the end of half an hour this is expressed, and, as by that time the formation of thrombi at the placental site has taken place, the patient is secured from further danger from this variety of concealed hemorrhage.

In the instruction of students nothing is more satisfactory than the unusual facility that men gain in making obstetric diagnoses, when started properly and allowed a certain amount of latitude in making examinations. So far as the conduct of labor is concerned, this, I believe, is the most important of all teaching, for a knowledge of the presentation and position of the child's head, gained by external examination, implies the relation of the head to the pelvis,—and the

only other element in the estimation of the course of labor is the amount
of dilatation obtained by the patient's pains. For ten years I personally
have made no vaginal examinations except in operative cases, and,
save for the practice of gaining familiarity with a cervix previously
palpated through the rectum, none of the internes in the hospital make
vaginal examinations. The student makes first an external examina-
tion and palpates the cervix per rectum. He then scrubs up and
makes a vaginal examination, and lastly checks up these two exam-
inations by a further rectal examination. It is surprising how quickly
the men learn to determine (1) the amount of dilatation of the cervix;
and (2) the position of the head in the pelvis.

It is obvious that in this way the number of contact infections must
be materially diminished, but even with rectal examinations we have
had occasional trouble with perineums which have not healed prop-
erly and mild infections which have appeared in the second week. The
patients most free from these mild complications have been those who
have undergone severe operations, for example the repair of complete
tears in the rectum, in which event they are kept absolutely at rest
and no purgative given. Whether or not purgation has an effect on
the normal course of such cases, it is difficult to say, but there is no
doubt that these cases did better than others which were handled less.

In my own work median episiotomy has been a practice for some
ten years. I have, however, to thank Dr. Pomeroy's advocacy of the
measure for the ability to teach it as well as practice it. With the
introduction of this measure by Dr. Pomeroy, more and more cases
have come into the afebrile and uncomplicated class. For this I think
there are two reasons: (1) the tissues about the perineum are far less
damaged; and (2) since the introduction of this method there is less
anesthesia and better control of the uterus, and less tendency to in-
terfere with the uterus during the third stage. After the birth of the
child, when a median episiotomy has been done, the anesthesia which
is sufficient for the passage of the child through the vulva is usually
sufficient for the introduction of a continuous submucous stitch in the
vagina and a subcutaneous suture in the midline of the perineum, and
one or two deep silkworm gut sutures to hold the deeper tissues to-
gether. If the uterus is let absolutely alone after the birth of the
child, these sutures may be laid with the greatest possible ease. Even
where the introduction is a matter of ten or fifteen minutes, there are
those fifteen minutes when it is absolutely certain that there will be
no manipulation of the fundus of the uterus, when the patient is grad-
ually gaining consciousness, and with the first few pains after coming
out of the anesthetic the placenta separates spontaneously and can be
readily expressed. The tying of the sutures is then a matter of a mo-
ment.

For the past few months I have been watching carefully those cases

in which there has been a typical so-called sapremia;—a mild grade infection manifesting itself often only after the patient has been examined for discharge, thirteen or fourteen days after confinement. I have found invariably that such cases were those in which the placenta did not come away spontaneously, where more or less massage of the uterus had been done, and where naturally membranes trailing in the vagina had swept up into the uterine cavity the debris from the posterior fornix. Not only are the membranes accountable for this, but, where there has been undue prolongation of the second stage, the perineum being allowed to distend slowly and the muscles to rupture subcutaneously, the relaxation of the uterine muscles allows the collection within the uterus of large clots, which invariably give trouble.

Our procedure, therefore, is to leave the uterus absolutely alone until after the placenta has separated, then to watch it carefully, giving no ergot, and at the expiration of from half to three-quarters of an hour to express from the uterus such clots as may have formed within the cavity, with the assurance that their re-formation is most unlikely.

A further feature is the relation of the bladder to the third stage. If the labor has been at all prolonged, the bladder will probably be distended. A distended bladder prevents proper contraction of the uterus and has, I believe, a mechanical effect in preventing the proper closing of the larger sinuses, mechanically favoring the extension of thrombi in the lower broad ligament. If then the emptying of the bladder is made a matter of routine with the laying of the sutures, not only will there be better contraction of the uterus, but the possibility of later catheterization is greatly minimized.

So far as the clinical management of routine cases is concerned, nothing has given us more satisfaction than the application of that method of treatment advocated by Dr. Ross McPherson. Even before the war I had collected a large number of cases showing the apparent beneficial results so far as temperature was concerned of the nonadministration of drastic purgatives during the puerperium. The results obtained were so similar to those detailed by Dr. McPherson that recently the routine order of castor oil has been discontinued, and patients are given a purgative only when they request it themselves. There have been many discussions over the cause of irregularity in temperature when purgatives are administered, but no definite solution has been offered. The fact remains that patients who do not have purgatives run a much smoother clinical course. To those in charge of clinics I would say, try this method, if for no other reason than the lessening of the amount of care required by the normal case and the resulting increased time of the nurses for the care of those patients who are seriously ill.

Much anxiety would be relieved if we could impress upon obstetri-

cians that postpartum hemorrhage is not a condition but merely a physical sign, either of serious damage to some portion of the birth canal, usually the cervix, or of improper closure of the uterine sinuses. The question of damage to the cervix is to my mind negligible, except in certain cases of version, where there is always danger in the reduction of the arms. The factors preventing proper closure of the uterine sinuses are not numerous. The importance of the bladder as a preventive of proper contraction is usually much underestimated, while the failure of the uterus itself to contract is usually the result of over-distention, overwork, prolonged anesthesia, or incomplete expulsion of its content. The tendency to hemorrhage after hydramnios, twins, or protracted pregnancy is well known, and should be specially discounted in the management of the third stage. Two other factors—retention of portions of the placenta and bleeding from improper or partial separation of the placenta, both I believe associated with a too active management of the third stage,—have been more or less eliminated for us in primiparas since the introduction of the Pomeroy treatment of the perineum. The facility of repair of incised wounds without additional anesthesia, the importance of laying the sutures during the second stage in a clear field, undisturbed by hemorrhage from the uterus, has increased the necessity for caution against manipulation of the uterus as soon as the child was born, and resulted in spontaneous expulsion of the placenta on recovery from the usually short and light anesthesia, and there has been markedly less tendency to hemorrhage.

In the last five years, in some thousands of cases passing through the Montreal Maternity, we have had not more than five breast abscesses, and none of these were in the public service. For this satisfactory condition of affairs I believe two factors are responsible: (1) the abolition of breast pumps; and (2) the discontinuance of any special treatment of the nipples other than care for cleanliness. In every instance where I have seen a definite purulent mastitis in consultation, I have made a point of investigating the previous history, and have been struck by the number of instances in which the breasts had been pumped in a previous pregnancy. To the mushrooming of the nipple, caused by the excessive suction of the pump, with a consequent opening of the ducts to extraneous material such as epithelium or dust, may be attributed a large percentage of blocked ducts, while the careless application of ointments for nipple protection acts very much in the same way. I do not deny that fissuring of the nipples is a comparatively frequent occurrence, but for this condition the application of the ordinary silver nitrate used for babies' eyes is almost specific. Occasionally too there may be definite collections of fluid in the breast, which for the surgeon have all the earmarks of distinct abscess, but massage toward the nipple will almost invariably free the

duct, and putting the affected breast at rest for 24 hours will effectively prevent the breaking of the capsule surrounding the breast tissue and the involvement of the fatty tissue of the breast. Not infrequently patients complain of pain in the breast, and there is a fluctuating mass and often a high temperature. In these cases a piece of white absorbent is the indicator. The ordinary milk will not stain the cotton, but the content of the distended sac invariably shows as a dirty greenish yellow. That this abnormal content contains bacteria is known, and those interested are referred to a very complete résumé of the subject by John F. Gardner of Toledo.

For the furthering of involution, hot vaginal douches of formalin are given on the ninth day. I have never known these to do harm. Intrauterine douches, on the contrary, I believe, do harm. In my own experience I have never had occasion to give an intrauterine douche immediately after labor, but I have used them not infrequently on the 14th day. The surprising thing about these late douches is the evidence they give of the rapidity of absorption from the uterus. Where there has been mild infection and rather profuse lochia, and a boggy uterus at the examination for discharge, irrigation will frequently be accompanied by a chill and rise in both temperature and pulse, but this is only temporary. On the other hand, where there has been no temperature and where the delayed involution has been due to retained membranes, which I believe may be retained without becoming infected, the irrigation of such a cavity gives rise to a rapidity of the pulse without any marked rise in temperature. This, too, is transitory.

TREATMENT OF THE CORD

The treatment of the cord is emphatically to let it alone. In the pre-prohibition days, we like many others applied alcohol for the purpose of dehydration. Recently the difficulty in securing alcohol led us to experiment with a plain dry dressing, and the results have been more than satisfactory—in fact better than when alcohol was used.

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EXPERIMENTAL STUDIES FOLLOWING OÖPHORECTOMY*

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THE conservation of the ovaries or of that portion of them that is not diseased is one of the aims of modern gynecology. This principle is applied, not only to disease of these organs, but especially in cases of fibromyoma where the uterus is to be removed. At this time, when so many cases of myopathic hemorrhage and fibroid uteri are treated by radiation from radium or roentgen rays, with the result that the ovaries become sclerotic and the artificial menopause is produced, a discussion of the desirability of retaining active ovaries is advisable.

The Brown-Séquard hypothesis that the ductless glands provide an internal secretion seems, at first glance, easy of proof, concerning the sex glands and especially the ovaries. The sequelæ, following the removal of these organs, are so well known that even the lay public readily accepts the plausibility of the theory that they produce a substance which gains access to the circulation and directly affects the body cells either through a specific reaction or by interaction with other endocrines.

Even in ancient time oöphorectomy was made use of in the horse and also in domestic animals as a preparation for their appearance on the market as food. In the young before puberty castration not only leads to an increase of fat, but also to an increase of the bodily frame amounting even to giantism. The sexual organs and the secondary sexual attributes do not develop and there is marked mental lethargy. At the time of the natural menopause there is tendency toward adiposity and a less energetic physical life. During pregnancy owing to the growth of the corpus luteum there exists a similarity to the climacteric period. There is deposition of fat and a considerable growth of the body that is far above any need of the fetus.

However, some of these facts are more apparent than real. That there is regularly an increase in weight at the menopause may be denied. Tilt[1] found a gain in only 43 per cent of 282 women following the natural menopause and Glaeveke[2] noticed a gain not above 25 pounds in 66 per cent of women having an artificial menopause. Jayle[3] found that in 13 women who had the uterus removed together with the ovaries 5 gained in weight; but of 14 cases where the uterus alone was removed there were 3 who gained. Of course, cases that have been suffering from tumor or inflammation and seek operative relief cannot be considered in good health and may be underweight.

Fehling[4] was the first to apply the suggestion of the existence of general bodily effect from the ovaries, when he argued for their removal in cases of osteomalacia. While other explanations have been made accounting for the results in such a procedure,[5] it is a fact that Senator[6] in 1897 was able to show an increase in the output of calcium and magnesium and alloxuric acid after the administration of ovarian extract to a patient suffering from this disease.

STUDIES IN METABOLISM

In an endeavor to determine the effect of the ovaries on metabolism and thus provide a scientific basis for Fehling's contention, Curatelo and Tarulli[7] conducted experiments with animals following oöphorectomy. They used a Voit apparatus and were able to show in one animal 34 per cent reduction in the carbon dioxide excretion following the operation. This animal also gained 17 per cent in its weight. There was a diminution in the phosphorus loss.

Loewy and Richter[8] in 1899 removed the ovaries of a dog and determined the metabolism by the Zuntz-Geppert principle. Following the operation there was an almost immediate gain in weight and a considerable diminution of the oxygen consumed even at the end of three weeks. At the end of six months there was a decided loss, the oxygen per kg. minute sinking from 6.1 c.c. to 4.8 c.c. After the administration of oöphorin tablets there was a gain of 67 per cent in the oxygen consumption with a rapid return to the new low level on discontinuance of the feeding. The authors warn against a general deduction being made from the result in this one animal and Zuntz, in whose laboratory the work was done, four years later examined the same dog and was able to obtain only a 6 per cent rise with fresh oöphorin tablets. He suggested that the results in this animal might be in the nature of an idiosyncrasy. It would appear, however, that the control after the dog was well advanced in its artificial menopause could not be considered as discrediting the earlier work.

In 1899, Hugo Luthje,[9] using the Voit respiration apparatus for 24 hour periods, undertook to control these experiments and adopted a most unique procedure. A male and female dog from the same litter were castrated, two other members of the same litter and of corresponding sex were used as controls. The male animal showed no difference. The female gained slightly in weight, but as it was on a regular diet and appeared in general more robust, this gain was discounted. Five months after the oöphorectomy the carbon dioxide excretion was 1.049 c.c. and the control 1.956 c.c. The nitrogen and phosphorus excretion showed but slight differences. This author came to the conclusion that the sex glands have no specific effect on the metabolism and offered the suggestion that the gain in weight in women at the menopause was not due to the specific ovarian influence, but rather to the change in the life and habits of the individual.

As these results were so strikingly opposed, Murlin and Bailey,[10] in 1917 attempted to settle the question. Two female dogs were castrated and one of them had had also a thyroidectomy. Their metabolism was estimated by the indirect method, using a constant temperature respiration incubator. In addition to the general control of the observation periods the urine was analyzed for nitrogen and the amount included in the figuring. Both animals gained about 900 grams and in the first there was a reduction in the metabolism of 17.5 per cent and in the other of 14.2 per cent. As these animals were not of the same breed and there was a difference of 2.5 kg. in their weight it is remarkable that these figures are so close. As fat takes no active part in the metabolism, their increase in weight may be disregarded, but even then there is a reduction of 12 per cent in one and of 6 per cent in the other. They were fed, perhaps, somewhat beyond their needs and they became less active following the operation. They also became familiar with their surroundings and ceased to fear when placed in the incubator. It appeared to us that these factors were worthy of consideration. It was believed that the dog without the thyroid would suffer a greater reduction than its fellow but the reverse was the case. In the one instance, therefore, there was no evidence of compensatory work on the part of the thyroid after the oöphorectomy.

The experimental evidence, in animals, of a direct effect of an ovarian secretion on the metabolism of the cell is not convincing but certainly points in that direction.

The only application of these principles to women was made by Zuntz[11] in 1904. He examined the metabolism before and after the removal of the ovaries in four women who were suffering from gynecologic ailments. There was no change at the end of 3 to 6 weeks in three of them. Of three who were later examined (periods of 7 weeks to $1\frac{1}{2}$ years) in two there was no change, but in one there was a considerable lowering. Zuntz explained this one instance by assuming that the so-called normal was unusually high as the patient at that time had pain and fever. He administered oöphorin tablets to three of the women and noticed no change. None of the women gained in weight.

ANIMAL EXPERIMENTS DEMONSTRATING THE RELATIONSHIP BETWEEN THE UTERUS AND OVARY

There is considerable difficulty in making an attempt to apply these laboratory results, and there is even the possibility that they are not due to the removal of the ovaries but to the secondary atrophy of the uterus. Sokoloff[12] has shown by experiment in animals that there is an atrophy of the uterus that follows the ovarian removal by about three months. He ascribes this result as due to the cutting off of the nerve supply during operation. Hofmeier[13] who noticed the same result

in the human ascribes it to a diminished blood supply. Carmichael and Marshall[14] taking great pains not to injure either the vessels or nerves removed the ovaries from rabbits and noticed at the end of six months decided fibrotic changes in the uterus. Marshall and Jolly[15] showed that the same condition exists in rats following the removal, but that it may be prevented by ovarian transplantation.

There is considerable clinical evidence that removal of the uterus leads to ovarian atrophy. Löwenthal,[16] as early as 1884, suggested that the menstruation processes, especially as regards the periodic bleeding, were not due to the rupture of the follicle but to some active principle existing in the mucous membrane of the uterus which stimulates the ovary. Blair Bell[17] also suggested that an internal secretion from the uterus stimulates ovulation.

Bond[18] conducted some experiments with a view to ascertaining whether there was not a uterine secretion which affected the ovaries. He was able to demonstrate by ligating the tube and horn of the uterus that a secretion was present which was heavy with albumin and salt. He conducted one experiment in which the entire uterus was removed and found later that the ovaries were normal. He concluded that the absence of this secretion from the uterus permitted the tissues of the ovaries to hypertrophy.

Grammatikati[19] in 1889 removed the uterus of rabbits and three or four months later examined the ovaries and found no degeneration or atrophy. Carmichael and Marshall apparently not knowing of these earlier experiments removed the uterus from three young rabbits and a few months later noticed no changes in the ovaries. Similar experiments but leaving a portion of the cervix also caused no ovarian change. The same results were obtained when rats were used as the experimental animals.

On the other hand Mandel and Bürger[20] performed hysterectomies on rabbits and waited for periods of eight months to three years before examining the ovaries. They found congestive changes with cystic degeneration and came to the conclusion that they could not have been functioning in a normal manner. Burckhardt[21] and also Keitler[22] doing the same experiments and waiting a long time before looking for sign of ovarian atrophy came to the same conclusion as did Mandel and Bürger.

An analysis of these experiments shows that no ovarian changes are present three months after removing the uterus but that they do appear considerably later.

CLINICAL EVIDENCE OF UTERINE OVARIAN RELATIONSHIP

The clinical data are exhaustive. Abel[23] in a review of cases of complete hysterectomy came to the conclusion that ovarian atrophy resulted and that the climacteric period proceeded as after oöphorectomy.

In cases that had a subtotal hysterectomy with some of the mucous membrane left, there were no menopausal symptoms and this led him to the conclusion that the ovaries in these cases remained normal. He stated his belief that the activity of the ovaries was dependent upon the uterus and at a discussion of this subject at the German Gynecological Congress in 1899, he was upheld by Zweifel[24] and others.

Mandel and Bürger[20] in an extensive study of the subject from the clinical standpoint reviewed the opinions expressed in this Congress and then detailed the results of 309 cases of complete hysterectomy with removal of the ovaries and of 96 cases with hysterectomy with one or both ovaries left *in situ*. Of those patients that had the ovarian removal 79.3 per cent showed symptoms of the artificial menopause and 48.5 per cent of these women had the signs almost immediately after the operation. These figures correspond with those of other authors. Mainzer[25] showing 71 per cent. Burckhardt[26] 85 per cent; and Werth[27] 87.5 per cent.

Of those cases that had one or both ovaries left *in situ* 67.7 per cent had signs of the artificial menopause and 30 per cent showed the changes at once. These results are in close accord with Werth's who had 62.9 per cent with menopausal symptoms under similar conditions.

In the first group of Mandel and Bürger's cases there were 58.3 per cent that gained in weight and in the second group 67 per cent. They noticed no changes in the general temperament that would favor the conservative rather than the radical operation. The follow-up on these women led to the same conclusion that Zweifel and Abel had expressed—that the ovaries atrophy following the total hysterectomy.

Alban Doran[28] reported the follow-up of 60 cases of hysterectomy. There were 6 cases in which both ovaries were saved and in three of these the menopause was prompt in appearing. There were 26 cases in which only one ovary was left and in 13 of these—50 per cent— the menopause was complete and immediate. There are three recent contributions in the American literature dealing with the relative value of the retained ovary. Vineberg (1915)[29] reviews the experimental work and detailed several cases of his own that were reoperated and showed degenerative changes in the ovaries, and expressed his belief that, as the statistics only revealed a 20 per cent lower frequency of climacteric signs in the conservative as compared with the radical procedure, it was as well to remove the ovaries in every case of hysterectomy.

Graves[30] found that the incidence of vasomotor changes as a sign of the climacteric period was 80 per cent in 233 cases of total ablation, and 81 per cent in 26 cases with one or both ovaries left *in situ*. He concludes that the retention of ovarian tissue after removal of the uterus is of no physiological value and that it may be of serious harm to the patient.

Polak[31] in 1918 reported the results of 73 cases of reoperation following hysterectomy with the conservation of one or both ovaries and came to the conclusion that the "Life history of the retained ovary is of short duration and the trophic influence of the diseased ovary has been overestimated."

IMPLANTATION EXPERIMENTS

There are some experiments relating to implantation of the ovary which support very strongly the view that there is an interrelation between the uterus and the ovary and that one is inactive without the other. Marshall and Jolly's[15] implantation experiments in rats showed clearly that in the animals in which the ovary was transplanted into one of the kidneys or into the peritoneum, the uterus remained normal while in the controls the removal of the ovaries were regularly followed by well marked fibrosis or atrophy of the uterus. It is evident, therefore, that the interrelation exists on the one side, that is, the uterus depends upon some trophic influence from the ovary for its maintenance.

Perhaps the most conclusive results dealing with this relationship are obtained by autografting and heterografting of the ovaries. Tuffier[32] reported the results in 173 cases. Twenty-four of these were heterografting, or the transplanting of an ovary from one patient to another, and 84 were autografting, or the transplanting of an ovary or a portion of one from its normal situation to another. These cases followed a complete hysterectomy. Under these circumstances the graft takes and after several months increases in size, periodically, continuing to do so for two or three years. The patients derived no benefits in these cases.

There were 65 cases of autografting in patients in whom the uterus had not been removed. Three or four months elapse before the ovary becomes active and in the meantime the menopausal symptoms persist. As soon as menstruation returns the symptoms are relieved. Tuffier concludes that the monthly ovulation alone cannot prevent the climacteric distress and that the bleeding itself brings relief. The conclusion to be drawn from this work is that ovulation and internal secretion from the ovary are not the necessary factors and that the real cause of the symptoms lies in the lack of menstruation. One of his conclusions is that "Ovulation without menstruation is useless."

W. J. Mayo[33] in a recent article on the "Conservation of the Menstrual Function" states that the preservation of the reproductive function is of the first importance and argues in favor of myomectomy rather than hysterectomy in women below 45 years of age. He calls attention to the fact that radium has a certain field in the treatment of fibroids but does not believe that it should be elected in place of myomectomy in younger women because of the danger of permanently

incapacitating the ovaries. He says "It is probable that menstruation itself has some important endocrine function."

CONCLUSIONS

Metabolism studies after oöphorectomy tend to show a reduction both of the oxygen consumed and the carbon dioxide eliminated. The greatest reduction occurs at a time some two or three months after the operation and when atrophic changes have probably occurred in the uterus. The experimental work, therefore, must be considered as inconclusive as regards the demonstration of a direct effect on the energy metabolism of the cell by an ovarian secretion.

Experiments conducted with a view of ascertaining the condition of the ovary after hysterectomy show that in young animals the ovarian development goes on in a normal manner. Work with adult animals would indicate that following hysterectomy no ovarian change may be demonstrated until after a three or four month period.

Clinical gynecology offers proof that the menopause ensues notwithstanding that the ovaries remain, if the uterus is entirely removed; and that saving a portion of the uterine mucous membrane so that menstruation may occur, prevents these symptoms.

Transplantation of the ovary is of no value in relieving menopansal symptoms, unless the uterus or part of it remains.

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22 EAST SIXTY-EIGHTH STREET.

Society Transactions

THE PRESIDENT OF THE ACADEMY, DR. GEORGE DAVID STEWART, IN THE
CHAIR

The program of the evening was arranged in cooperation with the
Section on Obstetrics and Gynecology.

DR. GEORGE H. RYDER read a paper entitled **The Administration of Pituitrin at Beginning of the Third Stage of Labor in One Hundred Consecutive Cases.** (For original article see page 61.)

DR. HERBERT M. LITTLE of Montreal read by invitation a paper entitled **The Least Common Multiple in Obstetrics**. (For original article see page 67.)

DISCUSSION

DR. WILLIAM E. CALDWELL.—One hundred cases in which pituitrin was used as soon as the baby was born does not prove as Dr. Ryder states, that pituitrin will never cause trouble. But he certainly has shown that its use is safe as a routine in the majority of cases. There were no cases of really adherent placenta in Dr. Ryder's series. I think that an adherent placenta is comparatively rare, but it certainly does occur; and it is conceivable that the pituitrin might make the manual extraction more difficult. In such a case it might be better to wait until the effect of the pituitrin had passed off. Or, if there were a partial separation with bleeding, it should be possible to overcome the action of the drug with chloroform anesthesia.

I believe that an adherent placenta should be removed manually and the uterus packed. Having seen some of Dr. Ryder's cases, and having tried it on some of my own, I believe the uterus acts very much better during the third stage when pituitrin is used. It does not balloon up as much, and therefore it is easier for the nurse, with her fingers on the fundus, to keep track of its condition. In multiparae, I am disposed to believe that there are fewer after-pains if we use pituitrin in the third stage.

I formerly thought that there might be a relaxation of the uterus after the effect of the drug had passed. Very few of Dr. Ryder's cases required a second dose of pituitrin or ergot to keep the uterus in good condition.

DR. RALPH W. LOBENSTINE.—For over a year, in upwards of 115 cases, I have been using pituitrin during the third stage of labor. Briefly my practice has been to administer 5 minims directly after the birth of the child and from 5 to 8 minutes after the expulsion of the placenta. The only modification of this dosage has been that, in those cases with a history of sudden violent hemorrhage in the third stage, a full ampoule of the drug has been given at the first dose—this being followed, after the expulsion of the placenta, with one ampoule of aseptic ergot.

I still believe in carefully holding the fundus during the third stage and in gentle massage in case of relaxation. My nurses are taught to do this correctly and I

myself or my assistant verify this from time to time. My patients in this series have all been private patients. Many of them were in rather delicate health—women requiring close watching. The unnecessary loss of an extra six or eight ounces of blood is often of real significance. I have not noticed that the placenta is expelled any more quickly by this method, neither do I agree with Dr. Ryder that it is an advantage to have it expelled quickly.

This method has certainly seemed to lessen the amount of blood lost, but it causes at times a disagreeable amount of pain during the first 24 hours postpartum.

In this series, one case only required tamponade, aside from cases of placenta previa, abruptio placentæ and vaginal hysterotomy. Should this method be generally used? No, I do not think so. For average cases it is unnecessary; it is expensive and may be dangerous.

DR. JAMES C. EDGAR.—Broadly speaking, I am opposed to the use of any drug during labor and while pituitrin is most valuable and I make it a point always to have it ready for use, I should hesitate to use it as a routine. The figures of those who have used it as a routine procedure point to less bleeding and a shortening of the third stage of labor as a result. My chief objection to its use is that it causes after-pains. One almost always has to follow it with some sedative in order to control the terrific after-pains that will not permit the woman to sleep. In the 100 cases was there not considerable pain following the use of pituitrin? Another objection is uncertainty as to its action. We have tried different preparations and have come to the conclusion that its action was to a considerable extent dependent upon the susceptibility of the patient. In some patients it did not have any effect and in others it acted out of all proportion to what one would have expected. Its excessive action is a great objection. I am accustomed to give one dram of ergot after the third stage. I am opposed to any medication during labor without positive indications. Some one may say ''What is a positive indication?'' A positive indication, I should say, is what is indicated for the comfort and safety of the patient. I have given it at the end of the third stage and repeated it at the end of two hours, and that is all.

I do not see why we should insist on a certain time for the expulsion of the placenta. I do not see why one should fix on 20 minutes. I think, if necessary, one should wait 60 minutes. I am old fashioned enough to go back to the old way of waiting two hours if necessary, of course, watching the fundus. Pituitrin offers a tremendous advantage in allowing the obstetrician to give more attention to the baby, but it takes only a few minutes to care for the baby. I am quite in accord with the statement that the average nurse does not know how to hold the fundus. She gets hold of the adipose tissue below the fundus and the fundus itself will go five or six inches above and will fill up with a large blood clot. I think it is the obstetrician's duty to watch the fundus.

Dr. Little's paper has touched upon some tremendously important questions. I am not prepared to throw overboard lateral episiotomy, though I think it looks as if Dr. Pomeroy's contention is correct, that the median episiotomy is the proper one. I have seen patients come back in whom it was hard to find the incision, though that does not mean that the muscles beneath are not torn. The claim is made that with the lateral incision one cuts into the belly of the levator ani on one side. I feel that on the other hand, there are many advantages connected with the lateral incision, especially the healing and the lessening of the danger of cutting into the rectum. I wish Dr. Little would speak of the extension of the incision into the gut, for there must have been some such accident without question.

I agree with what was said about anticipating trouble and not doing anything unless there were positive indications. There is, however, something more than that. It is the duty of the obstetrician to anticipate emergencies and not to wait until a

woman has lost a great deal of blood and has a pulse of 120 before preparing to do something.

I am quite in accord with what was said in regard to nausea and vomiting, but am not entirely in agreement about the mild kidney cases requiring emptying of the uterus. In a mild kidney case emptying the uterus is not always indicated, and then we are often forced to carry these women through, particularly if they are Roman Catholics, and with care, proper diet and keeping the skin active, many can be carried through. Mild kidney lesions may sometimes improve later. I have known instances in which a woman has gone twice to the eighth month and lost her baby and then in a third pregnancy has gone to full term. Where the maternal instinct is strong the woman will sometimes insist upon taking the risk and I am inclined where the lesion is mild to belittle the risk; at all events we must sometimes take it, though the kidney lesion is increased by pregnancy. Broadly speaking, however, a kidney lesion demands emptying the uterus.

DR. F. A. DORMAN.—Fortunately all women do not take the view of pregnancy Dr. Little has pictured. Many pregnant women are full of optimism and do not think of childbirth as going through the ''valley of the shadow.'' A certain proportion of women think it is a normal process. Dr. Little states that the pregnant woman can do pretty much as she likes. I disagree that they can be allowed their usual activities. Some can and are able to go through their pregnancy safely, but the woman who plays golf and tennis is apt to get herself into trouble and then she will ask why the doctor did not tell her to avoid unusual exertion. I advise against extreme, sudden, and violent exertion.

As to the nausea and vomiting, many women understand that a little nibble between meals will avert vomiting, but women who have an extreme aversion to food unless advised to eat frequently, neglect this precaution and suffer more severely.

Pyelitis we see occasionally but have not been flooded with these cases as Dr. Little says he has been. Very rarely do we get critical cases that demand emptying of the uterus. Personally I have felt that catheterization helped to find the stricture and that the patient responded to temporary drainage. I am a strong believer in the beneficial effect of posture, flooding the system with water, and urinary antiseptics. Ten years ago one of my patients had a baby which came to the eighth month. It weighed 4 pounds and, though undernourished, survived. Four years ago she had a second pregnancy accompanied by a very high blood pressure. The blood pressure was not taken during the first pregnancy. The baby died at the seventh month *in utero*. She now has a blood pressure of 170 mm. and a certain amount of albumin in the urine. That woman cannot see why she cannot be made well. In every borderline case if the woman has not had the advantage of treatment one may try careful diet and elimination and if she is a borderline case you may carry her through, but these are not the cases which are threatened with eclampsia.

I am a believer in rectal examinations. I believe we can learn almost everything in that way, but there are times when a vaginal examination is useful, and with surgical care I believe we do not get much morbidity. I would like to ask Dr. Little how he determines the condition of resistance of the cervix. Rectal examination of the cervix is not of the prognostic value that it would be if one had the finger in the cervix.

I would like to ask also what Dr. Little regards as the indications for episiotomy. Whether we should assume that we are going to tear the perineum and rather than have the possibility of sewing it up, do an episiotomy? It seems to me that the tendency at present is to lose heart and to do an increasing number of episiotomies. Where we have delivered a woman and preserved the perineum we have conferred a great boon upon her, though where there are vaginal tears it is well to proceed to

introduce the sutures before the patient comes out of the anesthetic. By prompt work we may avoid anesthesia in the third stage.

Dr. Little says he does not hold the uterus in the third stage. How does he know that the uterus is not filling up with blood? Also what is his rule where he discards cathartics? What is his rule in regard to enemas? We use the catharsis systematically on the third day, not because we think the patient cannot empty the rectum by an enema but because we think the catharsis relieves the distention of the breasts. I am heartily in sympathy with doing away with the breast pump. I think it gives an artificial stimulation to lactation. I also believe that an ordinary lump means very little and is not a cause for future abscess or mastitis, unless it occurs in the second week and is associated with a rise in temperature. The intra-uterine douches we have discarded. We prefer to use postural treatment, elevating the head of the bed if there is faulty drainage.

DR. W. E. STUDDIFORD.—A report from the Metropolitan Life Insurance Company seems to show that there is an increase in puerperal sepsis and a very evident increase in the toxemia of pregnancy. It may be questioned whether there is a real increase in the number of cases of puerperal sepsis or whether we are getting better statistics. Several factors may be responsible for increases in the toxemia of pregnancy. It is my experience, however, that we are meeting with an increased number of kidney cases, not eclampsia. It is a question whether the recent epidemic of influenza has not had an effect on these women. We know that persons between twenty and thirty years of age were most affected and that many attacks of influenza were followed by cardiovascular or renal pathology. Is it not possible that we are reaping the results of the epidemic of influenza in the mild kidney affections that we are seeing. It is important that such conditions be recognized early and the pregnant woman placed under treatment. Many of the mild kidney cases can be carried through while in others there occur placental changes and death *in utero*; some go on and become cases of the eclamptic type.

As regards the question of pyelitis in pregnancy, my experience has not always been that of Dr. Little. There are not many cases that go on to the point where the induction of labor is necessary. Most cases under proper diet, rest and posture treatment, where there is pressure on the ureter, will be relieved. Another factor in pyelitis, I am not so sure but that many are due to focal infections—focal infections involving both the tonsils and the teeth. The development of alveolar abscesses in a pregnant woman should be promptly noted or they may result in further trouble. Contrary to the old idea that no dentistry should be performed during pregnancy, I consider that proper and conservative dentistry is necessary.

One thing I should like to correct. In the description of episiotomy, whether it is median or lateral, the statement is made that the levators ani are cut. They are not cut. If they were we would have a worse condition than that following laceration. I feel that advocating episiotomy as a routine is not to be encouraged, since suturing the incision is not the simple procedure sometimes described and requires a certain amount of skill in surgical technic.

I think all of us remember the time when no case was submitted to an abdominal operation unless ten or fifteen grains of calomel had been given at night and salts and an enema in the morning, with the result that when the abdomen was opened the intestines filled the wound. We now know that it is wise not to give any cathartic unless it is mild catharsis two or three days before operation. The same principle applies to the postpartum routine. We can remember when a cathartic was given to every one in a surgical ward as a routine. Cathartics given in that way work only harm. There are women who do not need a cathartic on the second or third day, or if they do they need one of the mildest type. There are others who need more active catharsis; some may get along with an enema.

DR. RYDER, (closing the discussion.)—Dr. Caldwell says that objection has been made to the use of pituitrin in the third stage of labor, on the ground that it makes management of adherent placenta more difficult. I do not see why this should be so. The action of pituitrin lasts only twenty or thirty minutes and the attempt to express the placenta is rarely made before this. If the placenta is found to be adherent then, the action of pituitrin has already worn off, so that it can have no effect on the condition or treatment. Dr. Caldwell also mentions the possibility of relaxation of the uterus after pituitrin, as a criticism of its use. A study of this series has not shown any such effect. In 93 of the series the uterus remained hard for one hour postpartum. In 6 it hardened and softened alternately. And in 1 only did it remain soft persistently till another dose of pituitrin or ergot was given.

Dr. Lobenstine said that he believed holding of the fundus during the third stage was always necessary as a routine precaution against hemorrhage. I entirely agree with him. I think that if those who advocate leaving the fundus alone during the third stage, could have the amount of blood lost actually measured in each case, they would be surprised to see how much it was. We all know that the uterus does balloon up and fill with blood at times. In every such case there will be unnecessary loss of blood. Why not prevent this loss if possible?

Hour-glass contraction was not seen in any of this series. In one case there was difficulty in expressing the placenta. Three different attempts were made at intervals of twenty minutes, and then under ether it was expressed. In the non-pituitrin series, however, two such cases occurred, and in these, even the last attempt under ether proving unsuccessful, the placenta had to be extracted manually.

Both Dr. Lobenstine and Dr. Edgar spoke of pain after the use of pituitrin. I have never seen this, and I have been using it postpartum for years. Of course, many multiparæ have after-pains whether they have been given pituitrin or not. But I believe, if anything, pituitrin and also ergot lessen this tendency, by preventing the formation of intrauterine clots. At any rate, the action of pituitrin is of such short duration that I do not see how many of the after-pains can be ascribed to its use.

I entirely agree with Dr. Edgar that ergot given postpartum adds to the comfort and safety of the patient.

Dr. Edgar says he does not like a specified time of twenty minutes for the expression of the placenta. He thinks that in many instances a wait of sixty minutes or even of two hours would be better. I can see no advantage in waiting such a long time as this, as a routine procedure. I believe it would add to the amount of hemorrhage and to the discomfort of the patient.

The methods of managing the third stage of labor are not at present entirely satisfactory. They cause the obstetrician much worry. They are not understood by the average nurse. They allow unnecessary hemorrhage. The administration of pituitrin at the beginning of the third stage of labor is an attempt at finding a more satisfactory method. Whether or not it will prove to be so, further investigation may show.

DR. LITTLE, (closing the discussion).—I regret that in my brief paper a number of things were omitted which have been brought up in the discussion.

In the nephritic cases, I did not mean that all pregnancies should be terminated, but few nephritics with a history of one eight months' premature delivery show improvement in a later pregnancy or carry the child for a long time. In such patients you can never fix the time for induction of labor. In the first pregnancy allow the woman to carry the child as long as she can and do everything to help her. While it is more or less hopeless, it is worth while trying. I have never been able to bring through to term a nephritic who had had two previous miscarriages. The blood pressure remains high and there is infarction and thrombosis of the placenta.

In regard to golf, tennis, etc., I did not mean that a woman should take unusually violent exercise, simply that she might do the things she was accustomed to doing. The average woman gets down and scrubs and does all kinds of housework. Why not play golf or tennis? It is impossible to prevent women from doing many of these things except by constant supervision, and I have seen no ill results from freedom.

The teeth may bear some relation to the infection of the kidneys. The primary condition, however, is the hydronephrosis, often due to constriction of the ureter by torsion just outside its junction with the bladder.

I have tried both median and lateral episiotomy. The majority of primiparas have had median episiotomy, particularly if forceps was applied. We hear the older obstetricians say they never had a perineal tear. The pelves of women today are different. They are narrower and there is a closer approximation of the tuberosities of the ischium and a shorter bi-ischial diameter. Therefore a smaller proportion of children can have a spontaneous birth. Very often you cannot save the muscles of the perineum unless it is cut, and cutting the perineum relieves pressure on the bladder and diminishes the possibility of cystocele. I believe that, if you do an episiotomy and repair it, the woman is better off in a future pregnancy than if the perineum has been much distended or irregularly lacerated. I have seen patients go through a second labor after episiotomy without any damage of the perineum.

Unless there is considerable bleeding, I think it is better to leave the uterus alone, but I do not wait two hours. The less anesthesia, the better the uterus contracts, and spontaneous contraction is better than that obtained by drugs.

Dr. Studdiford says that some of my patients were uncomfortable without cathartics. Many, I believe, thought they were not getting enough attention. On the whole it has been pretty satisfactory, and a look at the charts will shew that there were fewer rises in temperature in the patients who did not have cathartics. Dr. Dorman spoke of a cathartic being given when the milk was coming in. It used to be thought that the giving of castor oil prevented milk fever. No one today believes in milk fever, and, if the woman is not going to nurse her baby, the milk will go just as quickly if you do not give a cathartic.

NEW YORK ACADEMY OF MEDICINE
SECTION ON OBSTETRICS AND GYNECOLOGY. STATED MEETING, HELD FEBRUARY 25, 1921.

DR. HAROLD BAILEY IN THE CHAIR

DR. SIDNEY D. JACOBSON presented a case of **Familial Multiple Enchondroses Complicating Pregnancy.**

The patient, Italian, twenty-three years of age, pregnant for the first time. At the age of eight she developed a small chondroma of the wrist. The growth was removed. At that time she had no other tumors. Two or three years ago she was operated upon by Dr. Fowler of Brooklyn, who removed a portion of the right ilium. The tumor recurred and a year later was removed. It was examined microscopically and found to contain pure cartilaginous tissue. While pathologically these tumors are benign, clinically they are malignant. About one year ago I removed a growth from her abdominal wall. Within four months of the operation the woman became pregnant and it was found that she had a metastatic deposit higher up in the abdomen and one of more recent growth lower down. The older one of these tumors shows a softened center indicating mucoid degeneration. In this case the tumors

are of the familial type. The woman's father, who was also presented, has a characteristic bowing of the radius and ulna and a deposit on one rib. A paternal uncle had the same condition. The removal of these tumors does practically no good because they continue to recur and eventually one forms near a vital organ, causing death. The patient has been advised to have her pregnancy terminated. It is a question whether it is wiser to terminate the pregnancy or to remove the tumor. The tumors are large and their removal will mean the resection of a large portion of the abdominal wall, and with the uterus increasing in size there would be danger of a large ventral hernia. Another point that has influenced me in deciding to let the pregnancy alone is the fact that during pregnancy there is a deposit of calcium salts in the maternal body which nature removes later and I have hope that she might be cured in this way since our therapy has been unable to do so. The x-ray photographs shown demonstrate that the patient has these tumors in her legs, arms and in practically every bone of her body. Cases are on record in which an enchondroma has been known to perforate the bladder or pregnant uterus. Numerous cases have been reported in which paralysis has resulted from pressure of these tumors on a nerve, and cases of aneurysm are reported as a result of their impingement on blood vessels, their sharp point having lacerated the fibrous coat of the vessel.

DISCUSSION

DR. H. C. BAILEY.—This case presents some interesting features. There is the question whether she should be allowed to go on with her pregnancy. There is no doubt that in this tumor there are malignant tendencies. We know that during or immediately after pregnancy there is a rapid growth of all tumors. A point that is both interesting and odd is that at the Memorial Hospital we have never had a case of general enchondrosis. Tumors of this type should be nonmalignant. Why does this one show a tendency to metastasize?

DR. FREDERICK W. RICE.—I have examined Dr. Jacobson's case. If the x-ray shows the pelvis free from the growth, I do not see why the pregnancy and labor should be affected in any way by the new growth.

DR. CHARLES B. DAVENPORT.—I am interested in this case because of the family history and have made inquiries of the father who himself shows the same osteoses. He states that his father, his father's mother, and a brother had the same condition.

DR. CHARLES CHILDS.—Before giving an opinion as to the desirability of terminating pregnancy I should like to know more of the patient's general condition. These tumors are not to my mind an indication for the interruption of pregnancy.

Dr. ALFRED M. HELLMAN reported a case and presented a specimen of **Chorioepithelioma.**

Mrs. U., aged fifty, presented herself at my office, November 27, 1920. She had been married twenty-three years, had seven children, and several miscarriages. The youngest child was full grown. The last miscarriage was in February, 1920, nine months before I saw her. She quotes her physician as saying that at that time she was four months pregnant. She had had no complete cessation of menses. After curettage at that time she bled irregularly for from four to six weeks and then stopped for two weeks. Two weeks before coming under my observation she was again curetted for severe hemorrhage. This failed to stop the bleeding.

Her complaints were uncontrollable bleeding, at times slight, at times severe, and great weakness with some loss of weight. Her systolic blood pressure was 128, and her urine was normal. The uterus was only slightly enlarged, soft, and bleeding slightly. I thought I was dealing with a cancer of the fundus, but did not lose sight of the fact that my patient might have a sloughing fibroid, or an incomplete abortion.

On November 29, I performed a diagnostic curettage which was of negative value only. There was little tissue obtainable and this showed a small round celled infiltration and no malignancy. Despite my thorough curettage the patient continued to bleed, and not wishing to wait for another hemorrhage, I advised hysterectomy, on December 3, and performed it on the next day. A panhysterectomy was performed, and the round ligaments sutured into the vaginal wall for support. A small perforation of the fundus was found. Despite a slight infection of the abdominal wall the patient made an uneventful recovery and was enjoying better health than for over a year.

The pathologist's report states that externally the uterus, tubes and ovaries appear normal except for the puncture wound noted at operation. On making a longitudinal incision the uterine cavity was found filled with blood clot. In transversely incising the fundus there was a slight protrusion of a deeply seated mass not previously visible, containing yellow and dark brown spots suggesting chorioepithelioma. The growth was not over ¾ of an inch in its greatest diameter. Microscopic sections show chorionic villi, syncytial masses, and a large number of Langhan's cells and numerous congested areas with heavy fibrin, and in places occasional mitotic figures and coagulation necroses. Along the course of the perforation are found syncytial masses, chorionic villi, Langhan's cells and mitotic figures, evidently a secondary growth. The diagnosis was chorioepithelioma.

Summarizing, we have here a woman almost beyond the child-bearing stage, with multiple pregnancies developing a chorioepithelioma with a secondary growth in the organ of origin, operated about nine months after the onset of the trouble, and enjoying perfect health ten weeks after total hysterectomy.

At the time I curetted the patient I had no suspicion that she had chorioepithelioma. We thought she had fibroids at the time of the menopause that were responsible for the continued bleeding. I did a most thorough curettage, but the bleeding kept up. I thought it only fair to the patient, whose hemoglobin was down to 50, to do a panhysterectomy. A careful study of the specimen explained the condition with which we were dealing.

Dr. HERVEY C. WILLIAMSON reported **Two Cases of Extraperitoneal Rupture of Lower Uterine Segment.**

CASE 1.—K. M., Admitted to the Bellevue School for Midwives December 18, 1916. Age 32, para iii. Last menstruation in April, 1916, exact date not known. Expected confinement January, 1917.

Surgical history.—A gynecologic operation was done six years ago, the exact nature of which was unknown to the patient. Subsequent to delivery the uterus was found adherent to the abdominal wall.

Menstrual history, normal. Began at fourteen, 28-day type, duration 3 to 5 days. No pain or other symptoms.

Previous pregnancies.—One long labor followed by forceps with stillbirth. One spontaneous abortion at two and one-half months.

Mensuration of the pelvis, normal.

Operative procedure.—The patient was seen on the afternoon of the 20th, having

been in active labor more than 24 hours. The head was just dipping into the superior strait, the position right occipitoanterior, and the cervix four fingers' dilated. The membranes were ruptured and there was no fetal heart. The patient was transferred to the Obstetrical Department of Bellevue Hospital. The patient was prepared and anesthetized. The cervix was dilated manually and the head perforated in the usual manner. After the solid blade of the Braun cranioclast was introduced within the cranial vault, the cervix was found to be so firmly contracted about the head that the fenestrated blade could not be introduced. The Tarnier forceps was then applied with difficulty, the compression screw tightened, and the head delivered. There was some difficulty delivering the shoulders but cleidotomy was unnecessary.

After the delivery a deep tear was discovered on the left side of the cervix extending through the vaginal vault and about 9 or 10 cm. into the lower uterine segment. The tear was vertical and extraperitoneal. The placenta and membranes were removed manually and the body of the uterus packed firmly, the tear was loosely packed. The cervix was united with three interrupted sutures and the vagina packed. The patient lost only a moderate amount of blood as the tear apparently did not traverse vessels of large caliber. She left the operating room in fair condition with a pulse rate of 130. Hypodermic injections of pituitrin 1 c.c., and ergot were given.

The packing was cautiously removed 24 hours later and pituitrin 1 c.c. given. The puerperium was uneventful aside from mild abdominal distention for the first three days, relieved by enemata. She went home on the ninth day postpartum.

The dystocia in this case was probably caused by irregular uterine retraction the result of ventrofixation. There was a deep lower segment tear with slight loss of blood and little shock. The treatment by packing and suture was effective.

CASE 2.—M. C., Admitted to the Bellevue School for Midwives December 12, 1920, age thirty-two, para x. Last menstruation in April, 1920, exact date not known. Expected confinement January, 1921.

Surgical history.—Amputation of the cervix and perineorrhaphy, September 18, 1915. Menstrual history, normal. Began at fourteen, 28-day type, duration 3 to 5 days, slight backache, no other symptoms.

Previous pregnancies.—Four full term children with normal labors, 14, 12, 10 and 7 years ago. These were conducted by midwives. Two miscarriages and three abortions, all spontaneous. Three occurred between the third and fourth pregnancy, and two afterward.

Mensuration of pelvis, normal.

Operative procedure.—The membranes ruptured spontaneously on the day before admission. The patient was examined at home, a transverse presentation, left scapuloposterior, was found with the cord prolapsed and pulsating. On examination at the hospital the cord was presenting at the vulva, strongly pulsating. The cervix was two fingers dilated, thick, but felt soft. Manual dilation was attempted. When the cervix was about two-thirds dilated, the left side suddenly opened into the lower uterine segment. The tear was vertical, about 10 cm. in length, and extraperitoneal. As there was very profuse bleeding the hand was immediately passed into the uterus and an internal podalic version and breech extraction performed. A premature living baby was delivered, but it could not be resuscitated. The placenta was immediately expressed by the Credè technic, the uterus, tear into the broad ligament, and the vagina packed tightly using about 35 yards of gauze. The tear was enlarged slightly by the delivery so that it was about 12 cm. in length. As the patient was in shock, a hypodermoclysis of 1000 c.c. was given. Ergot, pituitrin, camphor, and strychnine were given by hypodermic. Later a Murphy drip was used intermittently for 24 hours.

The patient recovered from the shock and on the following day the vaginal and

a little of the uterine gauze was removed. On the second day the remaining portion was removed. The puerperium was uneventful until the fifth day when, for no apparent reason, she had a moderately profuse hemorrhage. This was controlled by massage of the fundus, ergot by mouth, and morphine by hypodermic. She was not examined as the bleeding had stopped before our arrival.

Nothing further happened until the nineteenth day postpartum when she complained of pain in the left popliteal space, and on the following day a typical femoral phlebitis was in evidence. On the twenty-ninth day patient complained of pain in the right chest, and on the thirty-second day of pain over the region of the spleen, these symptoms suggested small infarcts. On the thirty-sixth day the phlebitis extended to the right leg. On the fifty-seventh day she had pain across the lower abdomen. Vaginal examination shows extensive pelvic thrombophlebitis.

The patient had an irregular temperature until the sixty-seventh day when it became normal and remained so. She went home on the seventy-fourth day on her own responsibility. Her general condition was good but there was still some edema of the lower extremities.

This case presents a traumatic rupture of the lower uterine segment, treated by packing, and complicated by pelvic and femoral thrombophlebitis.

DISCUSSION

DR. GEORGE W. KOSMAK.—This case demonstrates the conservative method of handling rupture through the lower uterine segment where the peritoneal cavity is not involved. We have had three such cases recently at the Lying-in Hospital. Two occurred in tenements. They were packed with gauze, sent to the hospital and made good recoveries. The third case occurred two weeks ago. The patient was a para ii who had a difficult labor. When the attending physician reached the hospital there was a history of spontaneous rupture of the membranes unaccompanied by pain and the patient seemed quite comfortable. There was a breech presentation and the cervix was dilated two fingers. The liquor amnii had drained away. A No. 4 Voorhees bag was inserted without anesthesia about 10 A.M. In a few hours active labor pains set in and the patient was delivered in the course of the afternoon. Two hours later the patient went into shock, the placenta having been retained. She was seen by a member of the attending staff who attempted to deliver the placenta but could not do so. I later found a tear extending through the lower segment of the uterus up to the round ligament. There was no tear in the cervix, however; I could introduce my hand through the cervix and into a hole on the left side of the uterus. There was very little bleeding. In fact I never saw so little bleeding in a case of this kind. As the woman was in shock we put in a gauze packing and gave her hypodermoclysis. She ran a temperature for two or three days and then it came down. An attempt was made to get the placenta this afternoon but we could not find it although we spent some twenty minutes exploring the uterus; all we found was a few tags of tissue. The particular feature in this case was the extensive rupture within the cervical ring and yet the cervix was not torn. The patient made a complete recovery. This is simply another instance demonstrating that we can treat these cases conservatively with good results.

DR. CHARLES GARDNER CHILDS, JR.—An interesting point in these cases is that in the first instance rupture occurred because the cervix was not fully dilated before the forceps were applied while in the second case it occurred because the cervix was rapidly dilated. The second case is an example of the fact that manual dilatation is an operation not always without dangerous results. I would like to emphasize the desirability of instrumental dilatation in preference to manual dilatation, for I feel that manual dilatation is far more dangerous than instrumental dilatation. I would like to know the length of time occupied in dilatation of the

cervix in the second case. Often during manual dilatation the hand becomes so tired that one uses more force than he realizes.

DR. WILLIAM E. STUDDIFORD.—The operative procedure in those cases is of great interest. As I understand it, in the first case there was a ventral fixation which did not allow of regular uterine contraction and there was imperfect dilatation of the lower segment. In such cases rupture of the uterus usually occurs higher up. The second cases gives the not uncommon history of a hurried effort to dilate the cervix after labor has begun. I think one reason for the rupture in this case was due to failure to recognize the relation of the fascial supports in doing the repair on the cervix at the previous operation. The muscular fibers were probably not brought together and the fascia brought together over them. In doing an ordinary circular amputation, the fascia should be stripped free from the muscles; the muscle fibers should be brought together first and the fascia brought together over the muscle in suturing the stump after amputation of the cervix and then one is less likely to have a rupture.

With reference to dilatation, I recall one case in which there was very little dilatation. An attempt was made to dilate with steel retractors clamped on the lips of the cervix. This was not successful and a cesarean section had to be performed. This woman had a subsequent pregnancy and a second cesarean had to be done for the same condition. This is one of the difficulties to be taken into consideration in amputating the cervix during the childbearing age.

With reference to the fact that there was little hemorrhage, the rupture does not usually involve the uterine artery, though the circular branch may be involved but it may have been ligated at the amputation. These ruptures are not accompanied by acute hemorrhage unless these vessels are involved.

DR. W. E. CALDWELL and DR. W. G. LYLE presented a paper entitled **Blood Chemistry in Pregnancy.** (For original article see page 17.)

DISCUSSION

DR. S. R. BENEDICT.—It is difficult to attempt any summary or conclusions of any type from so much data without an opportunity of examining them in more detail. A few points may, however, be touched upon.

This is a very important contribution and helps to complete the picture of metabolic studies reported by previous investigators. Murlin and Carpenter, and Murlin and Bailey have reported excellent studies of the total metabolism and the urinary findings in pregnancy. The present paper adds the blood picture in pregnancy and eclampsia. Perhaps the most striking results reported are the tendency to low nonprotein nitrogen and urea. Such figures as three to five milligrams of urea nitrogen per 100 c.c. of blood, as are here reported in some cases, have, I believe, not been duplicated in any other condition. It is obviously difficult to attempt an interpretation of these findings, but they suggest a line of reasoning which might be attractive. We must bear in mind that in pregnancy a condition exists where the same circulating fluid must supply both a growing and a stationary organism. A similar condition exists to a varying degree in cases of cancer, and it is very interesting to note that Miss Theis and Dr. Stone reported low urea and nonprotein nitrogen figures for cases of rapidly growing carcinomas of the breast and uterus. If we apply a primary law of physical chemistry to the growth process, we should infer that the growth of cells could be augmented by either increase in concentration of the reacting substances (food products) in the surrounding medium, or by decreasing the concentration of the products of the reaction (waste products). From this stand-

point then, the lower concentration of urea in the blood in pregnancy would tend to favor growth of the fetus. The similar finding in cancer is in line with this point of view. As Dr. Caldwell pointed out, although Murlin and Bailey reported that the urea elimination in the urine during pregnancy is below normal, due to retention of nitrogen by the fetus, which would ordinarily be eliminated as urea, this fact offers no explanation whatever of the low concentration of urea found in the blood in pregnancy. It must be that the condition of pregnancy offers a very specific stimulus to the kidney, which responds by maintaining a distinctly lower level of urea concentration in the blood than obtains under the usual conditions.

The study of amino acid nitrogen in the blood of both mother and fetus should be extended. This fraction of the nitrogen in the blood is probably used for tissue building, and it is interesting to note in the few studies reported that there is a definite increase in the amino acid content of the blood of the cord.

Concerning the rise in uric acid in the blood reported for eclampsia and previously noted by certain observers during labor, it may be stated with reasonable certainty that this finding cannot be explained through the increased muscular activity of the uterus, but that we must regard such uric acid accumulation in the blood as indicative of kidney insufficiency.

The main problem of the intoxication in eclampsia remains unanswered. At least there is nothing in the present findings which will tell us whether the failure of the kidney at a certain stage is cause or effect of the toxemia. Probably both factors are involved.

DR. CALDWELL, in closing the discussion.—In one case that died the autopsy showed an acute kidney condition and a typical eclamptic liver. This case had the highest ratio of urea nitrogen to nonprotein nitrogen, a ratio of 76. The cases in which there was a low ratio of urea nitrogen to nonprotein nitrogen recovered while those with a high ratio died. There was, however, not sufficient uniformity in the ratio of urea nitrogen to the total nonprotein nitrogen to permit one to classify the eclamptics into groups on that ground.

DR. FRANCIS WARD LANGSTROTH, JR. read a paper entitled **Focal Infection of the Cervix and Its Relation to Systemic and Nervous Diseases.**

(*Author's Abstract*).—It has seemed best to divide the study of this subject into two parts: 1. A consideration of all those facts which show that the endometrium of the cervix frequently becomes the site of focal infection, which is second to no other in its resulting systemic effects. 2. An analysis of 50 cases operated for the removal of this focus of infection at the New Jersey State Hospital at Trenton.

The writer wishes it understood that he does not claim that all cases of insanity can be cured by simply removing the diseased endometrium of the cervix, nor does he wish this paper to be construed as in any way sensational, but the results from this procedure in many of the cases operated upon were so pronounced that he feels it a duty to present the facts for consideration.

A study of the histology of the mucous membrane lining the cervical canal shows that we have here in the cervix a tissue well suited to become the permanent abode of pathogenic bacteria, and this has been proved to be a fact. Sturmdorf has shown photomicrographs of the cervical endometrium from cases suffering from chronic endocervicitis, which show all the classic signs of inflammation due to bacterial invasion. The writer has had numerous pieces of cervical endometrium cultured by the direct method in the laboratory at the New Jersey State Hospital at Trenton, and almost all of them produced a growth of pathogenic bacteria. In a previous paper

the writer reports the results of swab cultures taken from 60 cases of chronic endocervicitis among which only one was negative. (Preservation of the Procreative Function in Woman, *New York Medical Journal*, June 5, 1920.) In over 95 per cent of some 75 cases operated upon by the writer for the removal of their infected cervical endometrium, and reported in a former paper, the results were most gratifying. These patients were cured of all their pelvic symptoms and their leucorrhea was stopped; besides which they were markedly benefited in their general health (The Treatment of Infections of the Uterus and Cervix—A Preliminary Report of 75 Cases, Medical Record, June 28, 1919). The object of the present report is to establish the fact that chronic infection of the cervical mucosa with pathogenic bacteria occurs with great frequency and that it may become a focus of infection just as prone to cause systemic and mental manifestations as foci in the tonsils, teeth, sinuses, intestinal tract, etc. There is every reason to expect these results because the cervix is very freely supplied with blood and lymphatic vessels into which absorption of toxic products and even bacteria can take place.

We have had 29 of these cases of chronic endocervicitis infected either with the streptococcus or colon bacillus and in 13 others some form of staphylococcus was found, making a total of 42 cases in which a virulent infection was present. If then focal infections occur and cause remote effects anywhere, certainly the same is true in the light of these researches in the cervical endometrium.

In the present series of 50 cases, operated upon at the New Jersey State Hospital at Trenton, 58 per cent showed the same infection in both the stomach and cervix. This points strongly to a hematogenous or lymphatic transference of bacteria. Of these cases 44 per cent were infected with the streptococcus and 34 per cent were infected with the colon bacillus. Sixty per cent of the cases were infected with these two organisms either singly or combined. These findings agree with those in the first series and as far as can be determined with my cases of private practice, so that this probably represents the bacterial flora of chronic infection of the endometrium lining the cervical canal. Most of these cases reached the gynecologic service after every other focus of infection that could be found had been removed. They all, with two exceptions, exhibited clinical signs of chronic endocervicitis. The operation employed was the tracheloplastic method described by Sturmdorf which on account of its descriptive value acquired the name at the State Hospital at Trenton of ''plastic conical enucleation of the cervix,'' although various methods and modifications were employed. The fundamental object, however, was to remove completely the infected cervical endometrium. In addition ten perinorrhaphies were performed, in one of which an additional cystocele operation was done and one or both ovaries were removed in two of the cases. There were no deaths, and a gynecologic cure was obtained in practically all the cases, with a marked improvement in general health and a gain in weight that was very pronounced in most instances. As to the mental results, eighteen cases were improved after the removal of the teeth, tonsils, etc., but none were cured. From removal of the foci in the cervix 21 cases were improved, 15 of these having shown no improvement after the removal of other foci, while six had shown some improvement from the former work. After removal of their infected cervical endometrium 17 cases were reported by the hospital to have recovered mentally, 11 of these having shown their first improvement after removal of foci in the teeth, tonsils, etc. Six others showed no improvement until the cervical work was done, then recovered. Among the mental conditions in the improved cases were the following: Exhaustion delirium, manic depressive insanity, not classified; manic depressive insanity, depressed; epilepsy, constitutional inferiority, dementia precox, paranoid condition, psychasthenia and imbecility. Among the conditions reported as cured were manic depressive insanity, not classified;

manic depressive insanity, manic; manic depressive insanity depressed, toxic psychosis, hypomanie, neurasthenia, dementia precox, and one unclassed case.

We feel now fully justified as a result of this work in placing focal infections of the cervical endometrium upon a firm basis, second to no other, as a factor in the causation of systemic, mental, and nervous manifestations and diseases. And while we should not promise too much from a removal of these foci, still, no one would seem justified in treating many of the chronic diseases today without having all these foci sought for and removed by some one especially trained in his respective field.

DR. MAURICE O. MAGID.—When I saw the title of Dr. Langstroth's paper I assumed that the writer meant chronic endocervicitis. I am sorry that he did not use that term in the title, because chronic endocervicitis is now coming to be recognized as a pathologic entity. We used to speak of endometritis until it was proved that endometritis does not exist; that the changes in the endometrium are those which take place during the menstrual cycle. When Sturmdorf reported the results of his studies on chronic endocervicitis, he called attention to the pathologic possibilities that may accompany this local infection.

In my association with Dr. Sturmdorf for the past eight years, I had the opportunity to observe the various manifestations, both local and remote, all of which proved his contentions to be correct. There is proof in the literature that adnexal disease such as tubal distortion, cystic disease of the ovary, has as its primary cause this focal infection. The remote systemic manifestations, as depicted by Dr. Langstroth, are just as possible when we consider the infected cervical mucosa in the same relation as infection of the teeth or tonsils.

The cure for this focal infection has been described as a conical enucleation of the cervical mucosa. It is too bad Dr. Langstroth did not use the word "tracheloplasty" when he spoke of the operation, as he really performs the operation devised by Sturmdorf. When this operation is described under another name, many men do not immediately grasp the fact that it is really the tracheloplastic operation.

If Dr. Langstroth has proved to the satisfaction of all present, that systemic and mental disease may be benefited by this operation, I feel that we have just cause to disagree with the older authorities who maintain that any repair on the cervix of women in the childbearing period should not be attempted.

Such contentions are correct if one considers the Emmet operation by which the two raw surfaces of the lacerated cervix are sewed together. A great deal of the diseased cervical canal is retained and continues to act as a focus of infection. Sims' amputation has also many disadvantages, one having been shown by Dr. Williams' case of dystocia and rupture of the lower uterine segment. Leonard's statistics on Sims' amputation bear out this fact. Following the tracheloplastic operation, patients may readily conceive and there is seldom, if ever, any dystocia encountered in labor. I have a series of cases operated upon by this method in whom the labors had almost been precipitated rather than prolonged. A number of my patients who had remote disturbances in their joints were cured by the tracheloplastic operation.

As to the young woman cited by Dr. Langstroth, who had been mentally ill since she was sixteen years of age, there probably existed an endocervical infection in her early childhood. With the onset of menstruation, the infectious process which had been dormant, became active.

I am sorry to take exception to Dr. Studdiford, who, in speaking of Dr. Williams' case, said that the possible cause for rupture of the lower uterine segment is the inclusion of the fascia when suturing the stump after amputation. There is no

fascia under the mucous membrane covering the cervix. According to Sturmdorf, the muscle fibers of the uterus are arranged spirally and do not at any point completely surround the cervix. These muscle fibers end in the cervix in a serried succession of oblique circle segments which uncoil when the uterus contracts. This dilates the os like the iris diaphragm of a microscope. After amputation, the mechanism is disturbed because the muscle tissue in the stump is bound down in the scar, thus producing the difficulty in dilatation with the possibility of rupture of the lower uterine segment.

DR. HENRY A. COTTON, NEWARK.—I desire to emphasize the need of cooperation among the various specialists in attacking such a problem as we have tried to attack at the State Hospital. Scarcely any medical problem can be worked out by one set of men alone. From time immemorial the psychiatrists have taken care of mental diseases and only when they began to realize how much help could be obtained from other sources did they begin to get results. Where there is infection there is no doubt that results may be obtained by eliminating that source of infection.

We had one interesting case, a girl who gained seventy pounds after the removal of a focus of infection. She first came under our care at the age of sixteen or seventeen. After a time she improved and was discharged. Her mental trouble recurred six years later and she was under our care again for two years. She was found to have an impacted molar and an infection of the tonsils following an endocervicitis. The removal of these foci of infection resulted in a wonderful improvement. The girl is now a nurse in the hospital doing work she could not have done in her former condition. It is just as important to look for an endocervicitis as it is to ascertain whether the seminal vesicles are the focus of an infection. There have been cases in which every other focus of infection was removed without benefit until a focus in the seminal vesicles was discovered and removed and then the patient recovered. Following the elimination of cervical and other foci of infection we have had patients recover and remain well long enough to warrant the statement that their recovery is not merely temporary.

DR. GORDON GIBSON.—I agree that focal infection has a great deal to do with systemic disease, but I cannot say that it causes insanity or that its removal will cure insanity. We have not gone so far as to say that we have cured insanity, but we have grouped our cases into two general types, first, those characterized by dementia. In these we found that no operative procedure or medical treatment helped the patient, so we have disregarded dementia precox and epilepsy, conditions in which the patients are badly deteriorated, and we confined our work to those psychoses not characterized by deterioration. It is just these cases where the removal of teeth, tonsils, scar tissue, tumors, old adhesions, pustules, or any irritation at all, may be beneficial. We know that in sane women such irritations may give rise to nervous symptoms, and that the removal of the source of irritation will relieve the symptoms. Again we classified these cases in respect to the attack. If we saw the patient in the first attack we knew that sooner or later there would be another attack and we have tried to ward off the next attack. We have operated on some in the seventh attack. In those having a first attack all we hoped to do was to put the patient in the best possible physical condition and thus possibly to remove the exciting cause of the insanity. Then we have to watch them ten, fifteen, twenty years and see what happens to the woman; that is what we are waiting for. Of those operated on during the first attack we have found in the large number of cases that if there was a secondary admission the attack was milder and of shorter duration. In a series of cases operated in the second attack and seen in the third attack it was interesting that in at least five we have been able to increase the duration of

sanity between the attacks. One must remember, however, that about 80 per cent of these patients come from neuropathic stock and that any little disturbance or shock or systemic disease or toxemia will bring on an attack. I know of a case where one drink of whiskey served to bring on an attack. These patients just on the border-line of insanity are easily pushed over, and if one can demonstrate a pathologic process that can be removed, one is justified in operating in that type of insanity and the prognosis will depend upon the type of insanity under consideration. Acute intoxications may cause a woman to become insane, and if the infection is removed, the woman recovers, but there one is dealing with the actual cause of the insanity.

When I first started out with this investigation I was very enthusiastic, but after studying a thousand cases I became somewhat discouraged; one reason results were not satisfactory was that the women who went out from the hospital did not get good obstetrical care with their subsequent babies. Some of them had puerperal mania, which by the way is a misnomer; the term puerperal psychosis would be better. Where there is an underlying neuropathic condition, pregnancy or labor or the puerperium may be an exciting cause of insanity and therefore better care during pregnancy, labor and the puerperium will help in lessening the liability of these women to insanity.

DR. LANGSTROTH, in closing.—I would like to ask Dr. Gibson whether he made a definite effort to remove all the cervical endometrium up to the internal os. That is important. I have written previous papers on endocervicitis and given credit to Dr. Sturmdorf, describing his operation and I mentioned twice that the operation of choice is Dr. Sturmdorf's. It acquired his name early and I think many term it a plastic conical enucleation of the cervix. I have never had any intention of detracting from Dr. Sturmdorf's work; quite the opposite. I have named the condition a focal infection deliberately because I have never seen anything written as to the part played by the cervical endometrium in focal infection. I wished to put it on the same basis as infection of the tonsils and the teeth. Dr. Sturmdorf may have called attention to that, but I feel that this work has put chronic endocervicitis on a different basis, the basis of focal infection and nothing else. Furthermore, I believe that this is the first series of cases in which the attempt has been made in cooperation with other workers to benefit insanity and the neuroses, and certain cases have been helped by nothing else than the removal of this focus of infection. This is a report of focal infection and not on endocervicitis. The emphasis is laid on the removal of the focus of infection and is not a discussion of the methods of removal. In 17 cases a complete recovery was made and so they stand. They are practically all out of the hospital.

With reference to the type of insanity. I believe that practically all the cases cured were of the type which I understand do not show any destructive lesion in the brain substance. Manic depressive insanity, I understand does not show any microscopical alteration in the brain structure.

My personal explanation of the whole subject is that a toxic material of some kind is circulating in the blood and in certain cases it causes rheumatism, etc., and in some cases mental disease, and that in certain types of cases the removal of the focal infection entirely clears up the mental disease.

DR. COTTON.—We have a functional group of so-called dementias of which 77 per cent have recovered following the removal of all the foci of infection. I think Dr. Gibson's trouble was in limiting the work and in not giving attention to teeth and tonsils. The cause of many psychoses is infection; that has been substantiated and definitely proved. The hereditary and psychogenic factor is contributory, and the infection is primary. This will be realized in a short time.

OBSTETRICAL SOCIETY OF PHILADELPHIA,
STATED MEETING, JANUARY 6, 1921.

The President, Dr. Edward A. Schumann, in the Chair

Dr. John A. McGlinn read a paper entitled "**Tubercular Vulvitis.**"

Dr. McGlinn referred to the infrequency of tubercular infection of the external genitals and reported three cases personally observed at the Philadelphia Hospital during the previous summer.

All three cases were in colored women and were primary, no other part of the body being affected as far as could be determined. All the cases were chronic, the earliest case being of two years' duration and the oldest eight years. Two of the cases presented small lesions of the vulva, typical ulcerations, with edema of the surrounding tissues. One case presented very extensive ulceration involving both

Fig. 1.—Tuberculosis of the vulva. Dr. McGlinn's case.

vulva, mons, and the buttocks. The general health of all the patients was excellent. They were unable to determine the source of infection in any case. The cases were interesting to the residents and students who saw them, from the diagnostic standpoint. Not one diagnosed the correct condition, carcinoma and syphilis being the two diagnoses made. Syphilis was the unanimous diagnosis made in the case which showed a 4 plus Wassermann.

The diagnosis was confirmed in all three cases by microscopic studies.

The cases were treated by the roentgen rays but Dr. McGlinn was unable to record the final results.

DISCUSSION

DR. G. W. OUTERBRIDGE.—I have seen two cases in colored women during the past year at the Graduate School of the University. The first patient had a marked

swelling of the left labium just as in the picture of Dr. McGlinn's case, a vaginal ulcer and numerous papillary growths in the lower vagina. At operation we suspected either tuberculosis or syphilis. She had a four plus Wassermann. The general appearance led to a diagnosis tentatively of tuberculosis, which was subsequently confirmed by careful study of numerous sections which demonstrated tubercle bacilli in the tissue. The second woman presented a single sluggish ulcer on the left side of the labia. The microscopic section was not characteristic; it simply showed granulation tissue. The Wassermann reaction was negative on repeated examination. Treatment by roentgen rays made the condition markedly worse and had to be stopped. Dr. Schamberg saw the case and in spite of the negative Wassermann advised treatment by arsphenamine which produced marked improvement. She disappeared before the ulcer was entirely healed; but it was well on the way to healing. Whether this was a tuberculous ulcer it is impossible to say.

DR. JOHN M. FISHER.—I have seen a few cases. The characteristics that impressed me particularly were these: the patients were young, from twenty to twenty-five, the ulcerations were painless and of a serpiginous character, with coincident ulceration and cicatrization going on at the same time and intervening healthy structure. The cases that I saw were in the wards of Jefferson Hospital a number of years ago. At that time we treated them by curettement followed by the application of iodoform ointment and as a matter of course the constitutional treatment of the patient was not neglected.

DR. PHILIP F. WILLIAMS.—The paper called to my mind a colored woman who came to Dr. Girvin's service in the Presbyterian Hospital, with an ulcer about 1 cm. in diameter on the left labium minus. It was a punched-out ulcer about one-eighth inch deep, covered with a slight exudate. The general physical and pelvic examinations were negative. The Wassermann reaction was negative. A piece of excised tissue did not show tubercle, neither did it show any changes suggesting malignancy. The exudate subjected to dark field illumination showed no spirochetes. This woman was referred to Dr. Newcomet for radium treatment at the Oncologic Hospital and had three treatments and then went out of the hospital and I did not see her for three or four months. There was practically no change in the ulcer. I do not know whether that was tuberculous or not, but it illustrates the difficulty in diagnosis of ulcerative conditions about the vulva.

DR. EDMUND B. PIPER.—Dr. McGlinn will be interested in hearing of a young colored woman who presented an ulcer similar to that described by him, except that it covered more ground, about 6 inches in diameter and 8 inches long. We think it is both tuberculous and syphilitic.

DR. EDMUND B. PIPER presented a pair of scissors designed for perineotomy.*

This instrument is designed especially for median episiotomy, but may be used equally well by those who are accustomed to do the lateral episiotomy. Dr. Polak of New York rather insists upon the name perineotomy rather than median episiotomy as the proper name for this operation. His position in this matter is anatomically and obstetrically correct. This instrument is a modified bandage scissors. The angle of the blade in relation to the handle is approximately twice as acute as that of the ordinary bandage scissors. The scissors are grasped in a manner which would be upsidedown for a bandage scissors and the handle has been so arranged

that when the blade is placed in the vagina the upper handle will be approximately parallel to the floor. The guard is curved downwards and backwards, so that in cutting, when the unguarded blade is placed at the point on the skin perineum where the cut is designed to end, the guard will push the rectum out of the way of any possible incision.
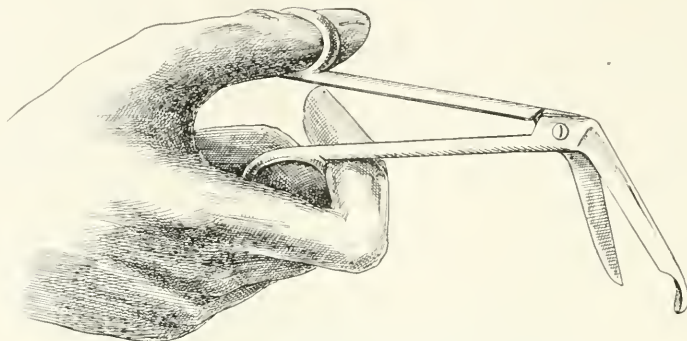
Fig. 1.—Dr. Piper's perineotomy scissors.

The principal advantage of the scissors is that perineotomy or lateral episiotomy can be done with the operator's hands in an easy position in both the normal case and the forceps case.

DISCUSSION

DR. JOHN M. FISHER.—I believe that episiotomy in many cases is done where a more satisfactory delivery would occur without it. In my experience an expected perineal tear of consequence not infrequently fails to materialize, and to have subjected such a patient to the operation would certainly expose her to the same risk that an unavoidable tear in another patient followed by primary repair would entail. Episiotomy in rare instances may be called for but to resort to it as a routine procedure is carrying operative measures in obstetrics to extremes.

DR. WILLIAM E. PARKE.—I have not adopted the routine practice of perineotomy but have employed it from time to time where it seemed appropriate; and at different times have been both pleased and disappointed in the result. When the median incision was used the tear has extended at times beyond the cut, thus nullifying the purpose of the operation; and not rarely when the operation was contemplated and not done, the end result showed that it was not necessary—no tear occurring. When everything works out as designed it is most satisfactory. I have adopted the lateral incision after some disasters with the median incision and find the coaptation of the parts more difficult and the resulting scar more conspicuous. I do not make the incision until the perineum is distended.

DR. JESSE O. ARNOLD.—Since the discussion has turned from the instrument to the operation, I will say that I am a firm believer in perineotomy. I have been doing this operation for a number of years and the more I do it the more favorably impressed I am with its advantages and good results. I see no reason now to believe from my experience that I will give it up. I think the more one studies and practices this method of aid in delivery the better pleased he will be with it. It seems to me that one of the greatest steps in modern obstetric progress has been that toward the doing away with the second stage of labor, as illustrated by the work of Potter of Buffalo, DeLee, Beck, and others of our own city, and this means in the majority of cases, a perineotomy. If we are going to deliver early and to a great extent take away the dangers both to the child and the mother, of the second stage

of labor, which I am quite sure we can do in a large majority of the cases, then we must either do as Potter does, dilate the birth canal with our hands—which I am not so sure that many of us would do so successfully as he appears to do it—or we must open it by an early, free incision of the perineum. I have been somewhat of a disciple of DeLee in his contention that the delivery of a child is a surgical procedure. I have gone to his clinic and watched his work, and am convinced that he and his assistants are doing the best work that I have seen along this line. So much have I been impressed by it that I am trying as far as I can to follow their methods and technic and must say that my results have been very satisfactory, both to myself and my patients. I have had a number of patients for second delivery and have invariably found conditions good. I do the lateral oblique operation. It should be done *early* to get the best results. When it is done early, the incision carried deeply through the muscles, and proper repair made, the results, in my opinion, will be far better than those usually obtained by prolonging the second stage for dilatation, either with or without evident tear.

DR. JOHN M. FISHER.—I would like to ask Dr. Arnold in what percentage of cases he does this operation?

DR. ARNOLD.—I do it on practically all primiparae and all multiparae that have had proper care in previous deliveries, before the head has pressed to any considerable extent upon the floor and before there is a stretching out and submucous separation of the fasciæ and muscles.

DR. NORMAN L. KNIPE.—I agree in part with Dr. Arnold and do episiotomy on most primiparae because it does prevent severe perineal lacerations. Lately I have been doing the Potter method of version quite frequently and find that by this method I get very few tears even without episiotomy. The more I do the Potter method the better I like it. Criticism of the method implies that the detail of the Potter method is not carried out. It is necessary to carry out every single part of Dr. Potter's version in order to get good results.

DR. JOHN A. McGLINN.—When you extend discussion to perineotomy and prophylactic forceps and Potter's version, it is far from the subject of the paper—"A Scissors Designed for Perineotomy." I may be old fashioned, but I have always looked upon labor as a physiologic process and I have come to look upon the most dangerous obstetrician as the "skilled professor who at the present time must do something to help the woman out." It is a queer thing that here recently we have been arguing that a man should not examine a woman unless he had on a pair of rubber gloves, then that he should not examine by the vagina but by the rectum and then we turn around and use all sorts of queer surgical devices to save a woman perhaps a half hour of pain. I cannot understand why we do this, except that it simply means we are tired of doing the things which we have conquered, there is very little left for us to do and we start on these new things. Potter's version is not good obstetrics, prophylactic forceps is not good obstetrics. I think if the men treat their cases in a normal, sane way and give Nature a chance they will find they have just as good results.

DR. GEORGE M. BOYD.—For a time I resorted to episiotomy. Then I stopped cutting the perineum in the median line or laterally because I found that it in no way diminished the frequency of the tears which are of moment in these cases. I refer to the deep internal tear of the vagina, either in the anterior wall or in the posterior wall, often involving the muscular support of the pelvic floor. The last median episiotomy I did was followed by a vaginal tear extending up the left sulcus and involving some of the fibers of the levator ani muscle. I am in accord with Dr. McGlinn in regard to the conduct of labor in general. I do not think that we are

warranted in cutting short the length of labor without a specific or definite reason. In the two operations recently suggested, prophylactic version or forceps extraction, why should we resort to major surgery simply to cut short the normal second stage.

DR. EDMUND B. PIPER.—In the first place I want to say that in presenting these perineotomy scissors I was not recommending episiotomy as a routine procedure. I belong to the school of intermediate repair, but I do episiotomy in certain selected cases. Dr. Arnold in speaking about episiotomy in regard to the position of the head in the birth canal, does it a little higher up than most of us.

I agree with Dr. McGlinn about forceps. I do not believe that Dr. McGlinn disagrees that if you cut the perineum a little to help a patient along that there is any objection to it. Dr. Boyd's criticism against perineotomy is in regard to a tear in the sulcus. Many times a tear occurs in the sulcus when episiotomy has not been done, and it is not so easily recognized. I do not believe that Potter's version or any other one way of doing things should be a routine procedure.

Department of Reviews and Abstracts

Conducted by Hugo Ehrenfest, M.D., Associate Editor

Collective Review

The Treatment of Abortion

By F. L. Adair, M.D., Minneapolis, Minn.

THE treatment of abortion must be considered from two points of view: (1) prevention of abortion itself; (2) prevention and treatment of the complications incident to abortion. The prevention of abortion necessitates an understanding of the causes. The predisposing and active causes of abortion have been classified by Taussig[1] as follows:

Predisposing causes. 1. Increased sensitiveness to nerve stimulation. 2. Greater tendency to placental thrombosis. 3. Lessened resistance to expulsion. *Exciting causes.* 1. Mechanical irritation. a. Transmitted. b. Direct irritation. 2. Thermic irritation. 3. Toxic irritation. 4. Nerve irritation. 5. Death of the fetus.

It is also necessary to deal with the different forms of abortions. We will first discuss (1) Induced abortion under three headings: (A) Self-induced. (B) Criminal abortion. (C) Therapeutic abortion, next take up: (2) Habitual abortion; (3) Missed abortion; (4) Pathologic abortion; and (5) Spontaneous or unintentional abortion. Under this last heading we will consider: (A) Threatened abortion; (B) Inevitable abortion, [(a) infected; (b) noninfected] (C) Incomplete abortion [(a) infected, (b) noninfected]; (D) Complete abortion [(a) infected, (b) noninfected]. We also subdivide all of the above types of abortion into those with serious hemorrhage and those without serious hemorrhage.

In speaking of serious hemorrhage, we shall consider first hemorrhage from two points of view: (1) immediately serious hemorrhage; (2) remotely serious hemorrhage.

(1) *The Immediate Dangers of Hemorrhage.*—The consideration of statistics indicates that fatal hemorrhages in cases of abortion and miscarriage are rare. Neu[2] in a recent article was able to cite only two cases of death from hemorrhage following abortion. One of these is not authentic. In the Frankforter Clinic from 1909 to 1920 in a total number of 4000 cases, there was no fatal case of hemorrhage. In Mecklenburg Schwerin, having a population of 600,000 people, from 1886 to 1909 no fatal cases of hemorrhage under five months gestation were reported. Hegar in forty years' experience never saw a fatal case of hemorrhage under three months pregnancy. Neu also found that of the 2279 cases from 1914 to 1920, in 1118 instances vaginal tamponade controlled bleeding. It is interesting to note in this connection that in 1914 to 1915—67.1 per cent of the cases were packed; 1915 to

1916—74.2 per cent; 1916 to 1917—71.4 per cent; 1917 to 1918—69.4 per cent; 1918 to 1919—11.7 per cent; 1919 to 1920—16.4 per cent. The reports of statistics of many other authors show practically no case of fatal hemorrhage. It may therefore be concluded that the danger of death from acute anemia is not very great especially in the first three months of pregnancy. It is somewhat greater in the second trimester though still very slight. Not over 8 or 10 per cent of abortions and miscarriages need any vaginal packing at all.

(2) *The Remote Dangers of Hemorrhage.*—Either one profuse hemorrhage, several moderate hemorrhages, or continuous moderate hemorrhage may prove of danger to the patient in that she is rendered more susceptible to infection. This clearly leads to the conclusion (1) that the attendant has and must take plenty of time to prepare the patient and himself before packing the patient; (2) that this is important on account of this greater susceptibility of anemic patients to infection. I might add from my own experience that in these cases absolute rest, elevation of the foot end of the bed, plenty of fresh air and avoidance of all manipulation are usually sufficient to arrest the hemorrhage. I have also found that in many cases pituitrin and ergot immediately aggravate the hemorrhage until the uterine contents are expelled, by exciting more active uterine contractions. On the other hand, I have found that the administration of a small dose of morphine gr. $\frac{1}{8}$ to $\frac{1}{6}$ together with atropin gr. $\frac{1}{200}$ to $\frac{1}{100}$ usually quiets the patient and checks the bleeding. I wish to call attention to the fact that codein is dangerous in these cases. I would advise against its use.

If it is necessary to interfere the patient should be carefully prepared and placed in the lithotomy position. The instruments should be carefully sterilized and the attendant himself prepared as for any aseptic operation. The speculum should be inserted and blood clots and unattached tissue removed from the vagina and cervix. The vagina should then be tightly packed, preferably with iodoform gauze, though plain gauze or cotton may be used. General treatment as for any other case with hemorrhage should be instituted.

Threatened Abortion.—In a number of cases of threatened abortion I have been surprised at the amount of blood which could be lost and the patient still go to term and be delivered of a normal child without detriment to herself or her offspring. I, therefore, advise against interference in these cases too quickly or without due consideration. Any case of pregnancy associated with spasmodic backache, pain in the lower abdomen of cramp-like character, especially if associated with uterine hemorrhage belongs to this group of cases. The treatment consists of absolute rest in bed continued for at least one week after the subsidence of all active symptoms, and return to bed on recurrence of any of the symptoms, the avoidance of cathartics, the use of small enemata or suppositories if necessary. So far as drug therapy is concerned, in my experience nothing compares to full doses of morphine and atropin. This should be administered as quickly as possible after the onset of the symptoms, preferably hypodermically in dose of morphine gr. $\frac{1}{4}$ and atropin gr. $\frac{1}{100}$. This is to be repeated and pushed to the physiologic limit if necessary. It often is difficult to tell when a threatened miscarriage becomes inevitable. Fever, odorous discharge, escape of amniotic fluid, shreds of membrane, indicate that it is inevitable. It should then be treated as such.

Missed and pathologic abortions.—Many of these threatened abortions, especially in the first six weeks are really pathologic and hence inevitable. Mall[3] has shown that a very considerable percentage of abortions in the first six weeks is associated with faulty embryonic development. This leads us to a brief consideration of what is known as missed abortion where the ovum, usually pathologic, is not discharged but is retained in the uterus for a number of weeks or months with slight or no symptoms. These conditions can only be diagnosed by watching the case and noting the nondevelopment of the uterus and the failure of the pregnancy to progress.

Inevitable Abortion without Fever.—In case of serious hemorrhage the uterus should be emptied immediately, as soon as proper preparation is made. Without hemorrhage, one may wait for spontaneous expulsion or remove immediately. There is practically no danger with proper technic in emptying a noninfected uterus.

Inevitable Abortion with Infection.—If there is serious hemorrhage, it should be controlled by vaginal packing to be removed within 24 hours when the uterine contents may come away or be easily removed. In infected, inevitable cases without hemorrhage, the uterus should be left alone until patient is afebrile for several days. If cultures are made in these cases and streptococci found, all intrauterine manipulations should be avoided. In any case where the uterus has once been entered, it should not subsequently be re-entered, at least not until it is certain that the patient is having an afebrile convalescence. Some authors advise the emptying of the uterus in these cases in the absence of streptococci, and if properly done it is not a serious procedure. Others advise waiting until the patient is afebrile from two and one-half to five days. If the pregnancy is under eight weeks, the uterus can be emptied at one sitting, by dilating the cervix and removing the contents with forceps or a dull curette. It is relatively safer to use instruments within the uterus under ten weeks than it is later because the uterine wall is firmer and thicker. It may be necessary in cases beyond eight weeks to use vaginal packing, bougie or bag for 24 hours before uterine contents can be removed, which should then be done carefully with forceps or finger. The use of the curette should be avoided in these cases.

Incomplete Abortions.—These cases make up by far the largest percentage of the cases. McPherson[4] figures that about 13.7 per cent of cases are complete, leaving about 86 per cent incomplete. The incomplete abortions according to Williams quoted by King[5] have a ratio of about 5 to 1 in hospital cases and about 3 to 1 in general practice. Paul Titus[6] estimates that about 66 per cent are incomplete. King[5] reports 121 cases of complete and 145 of incomplete abortions in his series. It is evident that the majority of cases are incomplete. Some authors go so far as to state that there is no such thing as a complete abortion. Vineberg[7] in an analysis of 287 cases of incomplete or inevitable abortions at Mt. Sinai Hospital during a period of five years found 60 with a temperature from 101° to 105° many of which were induced. All of these cases were curetted as promptly as possible after admission to the hospital. There were 2 deaths, making a mortality of about 3 per cent. He advocates active treatment for cases with retained tissue only.

Hallis[8] studied a series of cases at the Cook County Hospital analyz-

ing 200 cases which had a minimum temperature of 100° on the day of admission. These were divided into two groups of 100 cases each. In Group I the uterus was emptied artificially and promptly. In Group II treatment was expectant. He found that the febrile cases treated expectantly had fewer days of fever, shorter stay in the hospital, fewer complications, and a lower mortality. He concluded that no operative procedure should be carried out until the patient had been afebrile for at least five days. The uterus should be emptied only in case of alarming hemorrhage. The author ran a second series of cases which after a five day period without fever were assigned alternately to operative and expectant treatment lists. Of those on the operative list, only cases with persistent or profuse bleeding or retained placental tissue were curetted. On the expectant list, they were curetted only for hemorrhage. In the second series, no striking difference was noted between active and expectant treatment lists in days of fever, lochia, or stay in the hospital. Mortality was nil. His general conclusions are as follows: (1) Cases of septic abortion should receive no local treatment until free of fever for five days, except for hemorrhage; (2) Nonseptic cases should be curetted as a routine because: (a) 40 per cent have to be curetted, (b) curettage insures an empty uterus and prevents subsequent bleeding, (c) it shortens the stay in the hospital, and (d) the procedure is relatively harmless and accomplishes good.

Convert and Vignes[9] from a study of the literature relative to abortion conclude that the bacteriologic studies have not furnished sufficiently constant results to give us any definite indications for prognosis or treatment. They think that in uncomplicated abortions, noninterference is a method of choice. It is difficult to tell which is best in complicated cases, active or expectant treatment. Intervention is unanimously accepted in cases of retention and hemorrhage. They conclude that it is very difficult to determine the best treatment, especially in complicated cases.

Boldt[10] advises for incomplete abortions hot antiseptic douches with vaginal tamponade and, if necessary, tamponade of the cervical canal. In cases without bleeding, no manipulation is required.

McPherson[4] analyzes 3500 cases from the New York Lying-in Hospital. For incomplete abortions he recommends packing the uterus with iodoform gauze after proper preparation, removing any easily accessible clots or fragments of tissue with finger or forceps, removal of the packing in 24 hours followed by curettage. He advises against intrauterine douches and suggests the wiping out of the uterus with gauze and the application of tincture of iodine. This radical treatment was used in 2800 of the 3500 cases with a mortality of 3 per cent.

A committee of the American Medical Association on puerperal fever[11] in compiling their questionnaire drew the following conclusions: The majority of obstetricians and surgeons clean out a septic uterus at once. A considerable minority advocate expectant treatment, believing that ovular remnants are not particularly dangerous. It was generally agreed that a uterus once emptied should not again be invaded.

Watkins[12] believes that retained products of conception should be left to escape spontaneously. In individual instances, gauze packing

may be used to check bleeding, to hasten the separation of the tissue and to stimulate uterine contractions.

Ries[13] in discussing a series of 156 cases with a temperature of 100° F. or more concludes that cases of abortion without fever may be safely left to terminate spontaneously except in profuse hemorrhage. He thinks that the same rule applies to septic abortion, and advocates expectant treatment, no vaginal examination, as little manipulation as possible, packing only if required by hemorrhage, removal of packing in 12 to 24 hours, manual removal of uterine contents if necessary, no vaginal or uterine douche, no repetition of packing.

Titus[6] in an analysis of 274 abortions found a mortality of about 4 per cent. Of these 162 were incomplete. Seventy-three of these were infected, with 5 deaths. Mortality was 6.6 per cent of infected cases of 3.7 per cent of all incomplete abortions. Sachs,[14] with infection limited to the uterus, advises curettage unless a hemolytic streptococcus is present. In the latter case he advocates rest until the temperature is normal and the streptococci have disappeared, when the uterus should be emptied.

Müssler[15] in a study of 141 cases of febrile abortions favors expectant treatment. Cases are usually afebrile in two and one-half days. In his series there were 5 deaths, about 3 plus per cent. He advises two and one-half days' rest before any attempt is made to empty the uterus.

Kolde[16] analyzes 1318 cases in most of which the uterus was emptied immediately with a mortality of 3.2 per cent of all cases, 7.1 per cent of febrile cases, 3.8 per cent of the cases treated actively. He advises the dilatation of the cervical canal and the emptying of the uterus with the finger. Under five months he uses Hegar's dilators or laminaria, after five months, a small metreurynter or performs hysterotomy, removing the ovum with Winter's forceps and irrigating the uterus with hot, normal saline solution. Tampon was used only exceptionally.

King[5] advocates noninterference except in cases with profuse bleeding and in those cases where placental tissue appears at the opening of the cervix. He treated 145 incomplete abortions, and had no deaths in the series with noninterference.

It is clear from the above citations that there is no great unanimity of opinion regarding the treatment of incomplete abortion. It is hardly necessary to point out that a mortality of 3 per cent is not a negligible one. It would deter many from performing an abdominal operation. So far as hemorrhage in relation to incomplete abortion is concerned, we have already indicated that the immediate danger of hemorrhage is practically nil, there being almost no fatal cases of hemorrhage in all the series of cases which have been accumulated. The remote dangers of hemorrhage are very slight unless accompanied by infection. The important point of attack in the treatment of these cases is not so much to control the hemorrhage as to prevent infection. The cases of abortion which usually are infected are the self-induced, criminal, and those cases of spontaneous abortion which have been subject to vaginal manipulations. Without vaginal manipulation, the percentage of infections in abortions would be almost nil. It, therefore, behooves those responsible for the care of these patients to avoid any vaginal manipulation, even digital examination unless strictly indicated. When indicated, it should be conducted with the

most careful aseptic precautions. The prophylaxis of these infections would accomplish much more than the treatment of them after they have been acquired. Rectal examination gives considerable information of value.

We can safely conclude that retained products of conception, except in so far as they provoke hemorrhage, are in themselves not dangerous to the patient. It is the infection which is to be feared. Afebrile patients with incomplete abortion, with or without bleeding, may have the uterus emptied with relative safety if the procedure is properly carried out. Febrile cases, with or without hemorrhage, should be handled very cautiously. If the bleeding necessitates interference, as little should be done, as is necessary and that with the greatest possible gentleness. In most cases the cleansing of the vagina and careful packing would be sufficient. It also seems apparent from the literature that if a bacteriologic examination is made, the presence of streptococci, especially the hemolytic variety, constitutes a definite contraindication to active treatment. It is much better to leave all febrile cases alone and not invade the uterus during the febrile stage. A period of from two and one-half to five days without fever renders intrauterine manipulation relatively safe. We may state, then, that incomplete abortions are not dangerous unless infected; that infected, incomplete abortions are not particularly dangerous unless actively interfered with during the febrile stage; and that after active therapy is once instituted, the uterine cavity should be left alone. In general it may be said that most incomplete abortions become complete after time is allowed for Nature to expel the remnants. Briefly, the treatment of incomplete, infected abortion consists of expectant treatment, interference only to control hemorrhage, rest in bed, plenty of fluid, good nutriment, and an abundance of fresh air.

Complete Abortions.—These cases rarely present much difficulty from the standpoint of hemorrhage. It usually can be controlled by other means than local treatment. Noninfected cases require no treatment except rest and general hygienic measures. Infected cases should never be treated actively except for drainage of a uterus in malposition, or of localized abscesses. The treatment is that of all infections, which has already been outlined.

One might go into a great deal of detail regarding the treatment of the *complications of abortion.* Some of these complications are sterility, repeated abortions, local inflammatory processes, septicemia, pyemia, trauma, subinvolution, or persistent bleeding. A very large percentage of gynecologic operations are necessitated by these complications. Probably as high as 50 per cent of cases of salpingitis, requiring operation, have followed abortions. We have, therefore, in the prophylaxis and treatment of cases of abortion to consider not only the immediate mortality, and morbidity, but also a remote mortality and morbidity due to these complications.

All *induced abortions* carry with them a definite menace of infection, in self-induced and criminal abortions mortality and morbidity are very high. Therapeutic abortion when properly performed has a mortality varying greatly with the conditions which necessitate their production. The danger of coincident genital infection is relatively slight. Such abortions represent a very considerable percentage of the total number of abortions. How genital venereal infections can be

prevented and controlled is a matter mainly of education. It is more of a social than a medical problem. An ascending infection in this class of cases can never be obviated. The limitation or prophylaxis of *unintentional abortion* requires the careful supervision of prospective mothers beginning very early in pregnancy, or, if possible, even before. Much can be accomplished by appropriate attention on the part of the patient and her attendant to signs of threatened abortion. Many of these cases need not reach the inevitable stage. The treatment of repeated or habitual abortion is very closely connected with this problem. Many cases who have one abortion will have another unless properly cared for. McPherson[4] found that 27 per cent of cases having abortions gave a history of previous abortion, 9 per cent more than twice previously. The proportion of abortions to births varies greatly. Paris maternities[4] gives as the ratio about 1 abortion to every 8 births; Russian maternities, 1 in every 10; New York Lying-in Hospital, 1 in every 8; Kyssner, 1 in every 5.6; Markoe, 1 in every 23.6; Taussig, 1 in every 2.3. In the analysis of a series of cases made a number of years ago, I found it 1 in every 3 plus. All these figures prove the relative frequency of this condition.

The treatment of *repeated abortion* requires careful study to determine the cause. Too frequent repetition of pregnancy is one cause, especially repetition following an abortion. At least six months to a year should elapse before subsequent pregnancy takes place. Mechanical conditions in the uterus such as malposition or cervical lacerations, are a factor in many cases and these conditions should be corrected. Traumatic causes, overwork, overexertion, should be avoided. Infection and infectious diseases may be causative factors. Syphilis has been overestimated as a cause for early abortion. This disease operates more disastrously in the latter half than in the first half of pregnancy. Disturbance of ovarian function may be responsible in some cases. The actual cause, however, cannot be ascertained in a considerable number of cases of premature interruption of pregnancy.

In the main, treatment consists as far as possible in the removal of the local cause where it can be found; avoidance of strain or undue fatigue; removal of sources of infection; improvement of general condition of patient; administration of corpus luteum in selected cases; rest in bed in certain instances; administration of uterine sedatives when necessary; and the avoidance of undue emotion and excitement of any kind.

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Selected Abstracts

Gynecologic Radiotherapy

Eden and Provis: Uterine Fibroids and Chronic Metritis Treated by X-rays. The Lancet, London, 1921, cc, 309.

The authors base their report on the results obtained in a total of 76 cases, treated by x-rays. Forty-six of the cases were uterine fibroids and 30 cases of chronic metritis.

In selecting their cases they considered; (1) the age, (2) the size of the tumor, (3) the character of the hemorrhage, (4) the degree of anemia and (5) the presence of complications such as inflammatory disease of the appendages, degeneration of a fibroid, etc. The age of preference was thirty-eight years or older, because the deleterious action of the rays upon the ovary is of vastly less importance when the patient approaches the climacteric. Fibroid tumors extending above the level of the umbilicus were rejected because the shrinkage in such large tumors often is not sufficient to relieve all mechanical symptoms. They considered the type and amount of hemorrhage important because in cases of irregular or interval bleeding, or in any atypical bleeding suggestive of carcinoma, the uterus should first be further investigated to exclude cancer. The use of the x-ray is contra-indicated in patients with severe anemia because the first and often the second treatment often are followed by considerable hemorrhage. Consequently only the simple and uncomplicated cases are really suitable for x-ray treatment.

The technic adopted in most cases was a modification of that used in Krönig's clinic at Freiberg, the principle being the administration of massive doses of x-rays in the shortest possible time commensurate with safety as regards the skin of the areas irradiated. Two conclusions were arrived at; namely, the importance of giving massive doses and the administration of the treatment for one or two sittings after amenorrhea had been induced.

They protected the skin with a three millimeter aluminum filter, and further by a linen bag containing a loofah sponge enclosed in chamois leather, together with four layers of satrap paper. The amount of x-rays administered was roughly judged by placing a piece of Kienböck photographic paper, a strip of bromide of silver paper, over the area irradiated, which when developed served as a rough guide to the amount given. The technic is described by the authors in detail. Each treatment comprising exposures on two consecutive days, lasted three to four hours. The abdominal areas were radiated on the first day and the sacral areas on the second day. They found the time of choice for the treatments to be shortly after the termination of a period. Three weeks were allowed to elapse between treatments, as a precautionary measure against injury to the skin, the requisite number of treatments being four to six. The time dosage varied considerably, the limits being two hours and twenty-seven minutes to fifteen hours and thirty-five minutes.

The tumors in most cases showed rapid and marked shrinkage, while in some cases they actually disappeared. In only 10 of the 76 cases did they fail to produce complete amenorrhea and in only 4 of

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the 10 cases was the treatment completely unsuccessful in affecting the flow.

The general changes produced in their cases by this treatment varied. Some patients complained of mild fatigue, while in others there was relatively severe prostration. In a few the treatment had a stimulating effect. The changes in the skin, exposed to the rays, were slight, the most severe being a mild dermatitis. Aside from the local changes of the pelvic organs already mentioned only in one case developed a generalized pelvic inflammatory process several months after the last treatment.

Some patients had prolonged and severe "flushing". A majority gained in weight, but in no instance was noticed any loss of the feminine qualities of mind or body.

In conclusion the writers believe (1) that x-ray treatment should be the method of choice in women over thirty-eight years of age for all uncomplicated cases of severe hemorrhage due to chronic metritis or other conditions in which no neoplasm is present; (2) in uncomplicated fibroid tumors not exceeding the height of the umbilicus, occurring in patients over thirty-eight years of age x-ray should be regarded as the method of choice, and (3) all cases should undergo a careful and complete gynecologic examination to exclude malignancy, degenerating fibroid, and inflammatory complications before being subjected to this treatment.   NORMAN F. MILLER.

Knox: Treatment of Uterine Fibroids by Radiation. British Medical Journal, 1920, No. 3119, p. 535.

The author advocates very strongly the management of cases of uterine fibroids by gynecologists and radiologists working in conjunction. He thinks gynecologists must recognize x-rays and radium as valuable adjuncts in treatment. The Coolidge tube offers distinct advantages. Most satisfactory is a 3 millimeter filter of aluminum with a secondary filter consisting of chamois, thick paper, and a loofah sponge. He gives as contraindications to treatment by x-ray and radium: (1) calcareous degeneration, (2) most forms of extensive degeneration, (3) possible malignant disease of the uterus, (4) infective conditions, (5) inflammatory conditions of adjacent organs, and (6) submucous pedunculated fibroids. In his opinion radium possesses certain advantages over the x-rays, most important among them the facility of application and the accuracy of dosage.

                                                              F. L. ADAIR.

Williamson: Advantages and Disadvantages of X-ray Treatment. British Medical Journal, 1920, No. 3119, p. 537.

The author wishes for a better understanding of the problem by both the radiologists and gynecologists. He emphasizes the almost certain favorable operative results in the treatment of fibroid, and points to the fact that not all cases are suitable for x-ray treatment. Unsuitable are (1) patients under forty years of age, (2) all cases favorabe for myomectomy, (3) degenerative changes in the fibroid, (4) large tumors, (5) recent or old inflammatory lesions of tubes or ovaries, (6) malignancy, (7) pressure symptoms upon bladder, rectum, nerve trunks or veins, (8) fibroids complicated with ovarian cysts, (9)

fibroids complicated by pregnancy and (10) grave anemia with red cells less than $2\frac{1}{2}$ millions and hemoglobin below 35 per cent.

<div align="right">F. L. ADAIR.</div>

Lockyer: Radiology in Gynecological Practice. British Medical Journal, 1920, No. 3119, p. 539.

The author sets forth his conclusions as follows: (1) Radiotherapy acts by destroying the ovaries and by a destructive action on the cells of the myoma, (2) radium and mesothorium are not as suitable as x-rays because they do not cause shrinkage of the growths, (3) x-rays combined with radium or mesothorium produce prompter hemostasis than x-rays alone, (4) The French cross-fire with intensive technic gives the best results, (5) treatment is useless for submucous growths, (6) radiotherapy should be used only in cases uncomplicated by adhesions, degeneration, and malignancy, (7) gynecologists must determine the indications for treatment and watch the clinical development, and (8) radiotherapy is not a substitute for, but an adjunct to operative procedures. Further experience has caused the author to modify his views slightly. He thinks the use of radium might be extended to cases of chronic metritis and fibroids.

<div align="right">F. L. ADAIR.</div>

Martindale: Intensive X-ray Therapy vs. Hysterectomy for Fibromyomata of the Uterus. Archives of Radiology and Electrotherapy, 1920, xxv, 97.

In a series of 118 cases of uterine fibroids seen by the author since 1914, 25 cases remained either untreated or were treated by medical means alone. Of the remaining 93, hysterectomy was performed in 47 cases, myomectomy in 4 and intensive x-ray therapy was employed in 37.

The author concludes that x-ray treatment is to be preferred in the cases in which menorrhagia is the prominent symptom, when the fibroid is interstitial and does not exceed in size a six months' pregnancy. In cases where the fibroids are definitely pedunculated, in cases of submucous fibroids, or where malignancy was suspected, and, finally, in tumors larger than a six months' pregnancy, hysterectomy was performed. Serious organic diseases influenced the choice in favor of x-ray even in the larger tumors. Occasionally economic factors had to be taken into consideration.

The author gives his technic in detail. The average number of treatments given was 7, at 3-weekly intervals; the average number before amenorrhea was produced 4. Diminution in size of the tumor with relief of pressure symptoms comes on gradually and continues long after the cessation of the treatment. The amount of reduction, usually about half the original size, is mentioned in only 5 cases in his analysis. Menopausal symptoms are not severe.

A fresh series of two or three treatments was required because of a return of menstruation after an interval of some months in four cases. Two cases did not develop amenorrhea. One was subjected to hysterectomy two months after the seventh treatment; the other refused operation and was lost sight of after nine treatments. Four other cases were subjected to laparotomy following x-ray, two be-

cause of pain or pressure symptoms, one because of rapid growth of a multilocular ovarian cyst which had been mistakenly diagnosed as a soft fibroid and a fourth because of later development of a malignant tumor primary in the omentum, although she had been well and had had amenorrhea for a year following her 4 treatments. This patient died 10 days after her operation, all others with the exception of three which could not be traced, were in good health at time of writing. MARGARET SCHULTZE.

Nogier: Radium Treatment of Uterine Fibroids. Journal de Radiologie et d'Electrologie, 1920, iv, 537.

Radium rapidly checks menorrhagias and metrorrhagias even in young women. In the majority of cases, there is a marked diminution in the size of the fibroids; often even a complete disappearance. These results are obtained in the minimum of time and without any risk to the patient. Radium is the only kind of treatment available in exsanguinated patients and those afflicted with serious lesions of the heart or kidneys. Radium is superior to x-rays because it can be applied in the diseased organ itself, usually "in the geometric center of the organ." The skin is least endangered, whereas in x-ray therapy the skin receives most of the rays. Neighboring organs receive but a very attenuated dose of the radium rays and thus are not subjected to unnecessary irritation. If there happens to be an unrecognized carcinoma present, the radium directed against the fibroid will, at the same time, destroy the cancer cells. Finally, radium acts quickly and usually a single exposure is required. At most, the treatment will last only one week, and there are no untoward by-effects as after x-ray treatment.

Submucous fibroids, very large tumors with marked pressure symptoms, calcified or necrotic fibroids, cervical fibroids, the coexistence of adnexal tumefactions or of carcinoma call for surgical intervention. In all other cases, radium is preferable to surgery because it is simple, free from danger and devoid of shock or any of the surgical complications, and because it accomplishes a complete result without keeping the patient in the hospital longer than one week.
GEORGE GELLHORN.

Vineberg: Myomectomy vs. Radium and X-ray in the Treatment of Fibroid Tumors in Women Under Forty Years of Age. Medical Record 1920, xcix, 91.

The author states that myomectomy is by far the more conservative procedure in women who still have some years to the menopause than is either radium or the x-ray. In the first one there is conservation of the menstrual function; in the other two (if they are successful) menstruation in most instances permanently ceases and all the distressing phenomena of the artificial menopause appear. In a series of 120 myomectomies there was not a single death. Of the 31 private cases in the series, 9, or 27.7 per cent conceived afterwards. In none has there been a recurrence of the fibroid growth or of menorrhagia, although many of the patients were operated upon more than 5 years ago. In cases of hemorrhage, the uterine cavity should be opened and endometrium curetted under control of the eye, as advocated by W. J. Mayo. C. O. MALAND.

Nordentoft: A New Suggestion for Radium Treatment of Uterine Cancer. Ugeskrift for Laeger, 1921, lxxxiii, 76.

Nordentoft states that several German surgeons have given up the combined roentgen-radium treatment of uterine cancer and instead have adopted exclusively the roentgen treatment. The chief objection against radium is the unsatisfactory effect radium has on tissue lying at some distance. A necrosis of the tissue next to the radium is practically unavoidable if the dose is large enough to affect the remoter ramifications of the cancer. Recently, however, Amreich has described some means of overcoming this particular difficulty.

Nordentoft emphasizes the fact that the cancer spreads from the uterus into the tissues of the pelvis on both sides, resembling the shape of a butterfly. The wings are spread from wall to wall of the pelvis. He therefore, introduces one tube of radium into the cervix and then a second or third tube through a tunnel into the obturator foramen, on both sides if both parametria are affected. If 50 mgms. of radium with 1 mm. brass filter and black paper are placed into each of these three places for 22½ hours in one application, a permanent cure of the cancer can be expected. Nordentoft feels that only continued observations will show whether this treatment will be as valuable as the roentgen treatment alone.   KIRSTEN UTHEIM.

Haret et Grunkraut: Position of Pelvis for Radiation. La Presse Médicale, 1920, No. 89, p. 877.

The author strongly recommends two positions: (1) that known as Trendelenburg, (2) that of the knee chest position. The former is more applicable for radiation directed more anteriorly, while the latter is better for posterior radiation. The advantage of both of these positions is that if the intestines are movable, they slide away from the structures to be treated. The mobility of the intestines should be determined before radiation. The author thinks the best angulation of the body is between 30 and 40 degrees.   F. L. ADAIR.

Rohdenburg and Prime: The Effect of Combined Radiation and Heat on Neoplasms. Archives of Surgery, 1921, ii, 116.

It was found that by subjecting mouse and rat sarcomata and carcinomata to low degrees of heat (41° to 46°), certain changes took place in these growths, ending in necrosis, if the treatments were prolonged or repeated. The heat was applied by means of electricity (diathermy). It was further found that tumors so treated were much more vulnerable to moderate doses of x-ray.

Hoping thereby to extend the field of usefulness of radiotherapy, the authors have begun to apply this combined treatment to human beings.   R. E. WOBUS.

Rénon and Degrais: Pregnancy in the Course of a Myelogenous Leukemia Treated with Radium. Journal de Radiologie et d'Electrologie, 1921, v, 139.

A woman suffering from myelogenous leukemia improved under radium treatment to such an extent that she conceived and carried to full term. The child, now five and one-half years of age, is well

developed and shows a normal blood picture, though at the time of birth the mother had suffered a severe relapse of her leukemia. She died nine months after delivery, having received sixteen radium treatments within three years and one month. A leukemic woman may give birth to a healthy child because the placenta which permits the passage of soluble substances, is an impassable barrier to formed elements of the relatively large size of white blood corpuscles.

<div align="right">George Gellhorn.</div>

Items

Sheppard Towner Bill

The American Gynecological Society, at its Forty-sixth Annual Meeting held June second to fourth, 1921, took the following action regarding the Bill for the Protection of Mothers and Infants commonly known as the Sheppard-Towner Bill.

This action of the Society was taken, almost unanimously, after careful consideration of a report of its Committee on Maternal Welfare acting jointly with a similar Committee of the American Child Hygiene Association.

"This Society wishes definitely to state its position for the information of the medical profession and others who are interested in this legislative program.

"1. The committee is in thorough accord with the ends which this bill seeks to attain, namely, the protection of the health of mothers and infants.

"2. We endorse the coördination of all health activities under one head. We consider the protection of mothers and infants to be a *health measure* of paramount importance to the individual and the State.

"3. We oppose in principle the control of health measures by nonmedical individuals or boards.

"4. We believe in the local control of health activities as distinguished from federal. We approve and indorse the idea of propaganda and investigation emanating from the Federal Government.

"5. We do not indorse the Sheppard-Towner Bill in its present form because it does not conform to the above principles and because it embodies the questionable plan of subsidizing State Health Activities.

"6. We endorse the project of establishing a National Department of Health."

<div align="right">

President: George Gray Ward, Jr.

Secretary: Arthur H. Curtis

Committee: George W. Kosmak

Fred J. Taussig

Fred L. Adair (Chairman)

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Meeting of American Gynecological Society

At the Annual Meeting of the American Gynecological Society held at Swampscott, Mass., June 2nd, 3rd and 4th, 1921, the following new officers were elected for the ensuing year.

President, George Gray Ward, Jr., 48 East 52nd St., New York. First Vice President, Barton Cooke Hirst, Phila. Second Vice President, Walter P. Manton, Detroit. Secretary, Arthur H. Curtis, 104 South Michigan Ave., Chicago. Treasurer, Brooke M. Anspach, Phila. Other Members of the Council. Walter W. Chipman, Montreal. Dougal Bissell, New York. Fred L. Adair, Minneapolis.

The next meeting of the Society will be held in Washington, D. C., on May 1, 2, and 3, 1922, and the Headquarters of the Society will be at the Hotel Washington of that city.

Book Notices

Acknowledgment is made of the receipt of the following books, selected reviews of which will appear in early numbers.

UEBER DIE ENTWICKLUNG UND DEN AUSBAU DER SUPRASYMPHY-SÄRAN SCHNITTENTBINDUNG. By Emil Vogt, Berlin, 1921, Verlag von S. Karger.

DIE THERAPIE DER PLACENTA PRAEVIA. By Dr. F. Hitschmann, Berlin, 1921, Verlag von S. Karger.

Original Communications

AMERICAN GYNECOLOGY*

An Appreciation

By W. W. Chipman, M.D., Montreal, Que.

FORTY-FIVE years ago this Society was formed, and Fordyce Barker was the first occupant of this Chair. At the Inaugural Meeting Thomas Addis Emmet read the first paper; and Robert Barnes of London, an Honorary Fellow, was a distinguished guest.

Of the thirty-nine founders, twenty-eight were present, and there were three guests from Canada,—Trenholme of Montreal, Hodder of Toronto, and Rosebrugh of Hamilton.

The president's address closed with these words:—"Let me express the hope that this Society may command the approval of the highest and most cultivated judgment of the scientific world, and not incur the reproach which Job in his bitterness uttered, 'Ye are all physicians of no value.'"

So, in that memorable year in your country's history, that hundredth year of your national life, this Society was born. And as a Society it has lived, and lived to a full measure of its gift. On its Fellowship Roll are to be found the great national and international names of its time, the builders everywhere; men who have obeyed to the last behest the terms of the Constitution:—"to promote knowledge in all that relates to the Diseases of Women and to Obstetrics." At no time and from no man has this Society incurred the odium of Job's reproach.

Note: The editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

Among these names there are seven from the Dominion of Canada, seven names that bear witness to a generous recognition. And by a very gracious mandate a Canadian now sits in this Chair, and the McDowell gavel, for the first time in its history, is in the keeping of a neighbor.

Gentlemen of this Society, may I first thank you for this great honor. I thank you on my own behalf, on behalf of McGill University, and the country which I represent.

My first duty is the sad one of recalling to your minds the deaths of the Fellows during the year.

Five of our Honorary Fellows have been gathered to their fathers:— Benjamin F. Baer, on the eleventh day of last September; John C. Reeve, four days later; Matthew D. Mann, on March 3rd of the present year; Joseph Taber Johnson, on the fifteenth day of the same month; Bache McE. Emmet on May 30th; only four days ago.

These men had all passed the limit set by the Psalmist, and they died, full of honors, as full of years. This Society owes much, not only to their professional attainments, but also to their character and work.

Benjamin R. Schenck, of Detroit, died on June 30th, a month after our last meeting. For nine years he had been an Active Fellow of this Society. His untimely death, at the early age of forty-eight, cut short at noonday the abundant promise of his life's work.

I have chosen as the subject of my address "American Gynecology," and I have called it "An Appreciation." In the truest sense it is an appreciation, for it is an attempt to portray in their proper order of time and place, the large and signal contributions which America has made to this great specialty. This picture will be very broadly drawn, at somewhat of the friendly distance between Canada and the United States, and with the freedom of a neighborly perspective.

I shall include, of course, obstetrics; for gynecology and obstetrics are not only linked together in this Society, but they are copartners from the very nature of the business. Obstetrics has been, from the beginning; and shall continue, I take it, to the end. If it is important to be in the world at all, the matter and the manner of our entrance are a first consideration. With this universal, this world-immigration, gynecology must always be concerned, for it maintains the health and repair of this birth-entrance. Born as she was in the early days of the nineteenth century, gynecology is no longer "rocked in the obstetric cradle, sucking the withered ancestral finger," but has already reached the stature of a full womanhood. "A daughter still in her mother's house, she is mistress in her own" in Kipling's paraphrase expresses best the relationship that should exist between these two subjects.

Thucydides said of the ancient Greeks that they "possessed the

power of thinking before they acted, and of acting too"; and it is just the power of thinking and of acting that has set its seal upon this later Magna Graecia,—our own America. This is our large inheritance from the modern Greek, the Anglo-Saxon race; it explains indeed our own existence, and why we are gathered here today, near that famous Colonial city of this larger Agrigentum.

I shall not urge again the parallel that is so often drawn between Greece with her Mediterranean Colonies, and Britain, with what Sir William Osler called "her greater Britain." This analogy that makes our first Atlantic sea-board the Sicily of the Greeks is sufficiently exact, for in that Colonial period this great country was born, and received its birthright, the gift of thought and action of the English race. The Pilgrim Fathers and the Virginia Company changed their sky, it is true, but they changed neither their character nor their characteristics. They brought with them their own race qualities, a courage, a practical sense, an energy in work and, above all, a love of freedom. And they stamped these as a seal upon us, a lasting impress; for through chance and change we are, and we always will be, an English-speaking and an English-thinking race.

And the New World has but strengthened and accentuated these racial characteristics. Assuredly there was a large house to put in order and abundant need of energy, originality, and self-reliance. And so, from the beginning, and through necessity of inheritance and environment, these have come to be the essential quality of our national genius.

Let us now see what all this has done for the growth and development of American medicine, and particularly as it pertains to our own specialty. As we shall learn, it is a remarkable story and, along certain lines, a wondrous achievement. It is a record of but three centuries, for only three hundred years ago Giles Firman, Samuel Fuller, and John Winthrop practiced medicine in Massachusetts; while Lawrence Bohun and John Pott were the first physicians in Virginia. They not only practiced medicine, but they took an active share in civil life; or, like the apostle, Luke, they preached the gospel, the "angelical conjunction" of Cotton Mather. Giles Firman was our first medical teacher, as usual, underpaid; for, later on, he took orders, finding Physic "but a meane help."

These men and their successors were our first emigrant physicians, men of sterling worth, "and of constant if not warm affections." They practiced the medicine of their time, William Harvey had just discovered the circulation of the blood, and obstetrics was the concern only of the friendly midwife.

These emigrant physicians were chiefly from Great Britain and, as time went on, they trained their sons as their "apprentices," and sent them back for their degrees to Edinburgh and London.

A wonderful band of men, even from the beginning, were these native-born apprentices! For it was they who, in due time, founded our medical schools, and really created American medicine. Of such were John Morgan, Benjamin Rush, William Shippen, Jr., Samuel Bard, Caspar Wistar, Philip Syng Physick, John Warren, and James Lloyd. The very names are enough to recall their greatness. We read of William Shippen, Jr., that he was the first professor of obstetrics in our earliest medical school of Pennsylvania, and that he taught also anatomy and surgery there. "In providing a convenient lodging, under the care of an honest, sober matron, for poor lying-in women, he established the first Maternity Hospital." Dr. Samuel Bard, Professor of Physic, in King's College, afterwards Columbia, wrote our first textbook on obstetrics; and James Lloyd, an eminent surgeon, using ligatures instead of the searing cautery, was the first in Massachusetts to devote himself wholly to this subject. Benjamin Rush is justly named the American Sydenham; and Philip Syng Physick, who introduced the absorbable ligature, is called rightly the Father of American Surgery.

These were great men, and they lived in an auspicious time, for the revival of medicine in England, in the 18th century, was at its height. They all had worked and studied with John Hunter, the greatest scientist since the time of Aristotle; the one, be it remembered, a Greek, and the son of the Stagira physician, twenty centuries before, and the other a Scot, the son of the Calderwood laird. They had studied also with the great brother, William Hunter, the founder of scientific obstetrics; with William Smellie, his teacher, with Cheselden, and Pott; they knew as friends and teachers Heberden, John Fothergill, Lettsom, and Thomas Dover. Seven of them were graduates of the University of Edinburgh, where they sat under the Monroes, Cullen, and John Bell. From these men they had learned, by precept and example, they had gathered from them wisdom and experience, and lifelong friendships were formed here which even the War of the Revolution could not sever or destroy.

And so at this time and in this way were laid the foundations in America of medicine, surgery, and obstetrics. Morgan, Shippen, Physick, and Rush were in a manner the great prophets, the forerunners to prepare the way for the illustrious achievements that were soon to follow.

These achievements embrace the brilliant history of American surgery, especially in the domain of the pelvis and the abdomen; and these we owe largely to the founders of operative gynecology, McDowell and Sims.

Ovariotomy it was that made possible all abdominal surgery, and so now let us trace shortly the origin of this idea and its achievement.

The famous story runs that Ephraim McDowell was born in Virginia, March 11, 1771. In 1793, the year of John Hunter's death, he went to Edinburgh, and sat for a year under John Bell, through whose eloquent teaching he was early impressed with the hopeless state of women afflicted with ovarian disease. He did not take his degree, but in the following year returned to the village of Danville, Kentucky, bringing with him, no doubt, the teaching of the time in respect of "Ovarian Hydatids."

This teaching may be summarized as follows. William Hunter, forty years before, had said, "I am of opinion an excision can hardly be attempted, and the trocar is the only palliative;" while John Hunter in characteristic phrase, pronounced that, "if taken in their incipient stage 'hydatids of the ovary' might be taken out. There is no reason why women should not bear spaying as well as other animals." John Bell's teaching stated, "I hope success may attend this operation!" This, if you like, was the birth of the idea, and this idea it remained for McDowell to carry into execution. And so, in Danville, on the thirteenth day of December, 1809, this great operation was first executed. "I am but an instrument in Thy hands," was McDowell's prayer on that December morning, and an efficient instrument he proved himself to be. So was given to the world an operation, the value and far-reaching effect of which can never be overestimated.

By this operation the gates were set ajar to the opening of a new surgical life. But these gates were slow to open, and we remember with pride today the names of Nathan Smith, David Rogers, the brothers Atlee, Edmund Peaslee, Burnham, Kimball, and Dunlap. It needed courage in those preanesthetic days, for the operation was condemned by the profession as being "cruel, barbarous, and unjustifiable," while among the laity, the operator was designated as "a butcher, a murderer, or as a cross between the two." In forty years but thirty-six operations had been performed at the price of fifteen lives; and we can scarcely wonder that but eighteen surgeons had essayed the undertaking. The brothers Atlee will always stand among our foremost surgeons; John was the older, and the pioneer; but Washington L. the more distinguished. The latter made the record of his time, of 387 operations for "ovarian dropsy." Peaslee came later with his improved technic, and the larger number of recoveries; he was the first to use the normal salt solution, or "artificial serum," as he called it; and, above all, he was an excellent exponent. His work on "Ovarian Tumors," published in 1872, embraced the knowledge of the time, and made him and his country famous. In this classic, the names of Charles Clay of Manchester, who gave us the word ovariotomy, and Spencer Wells of London are generously remembered; indeed, the latter is named in the dedication of the book, "the greatest of ovariotomists."

The first step is the most important, even in major surgery, and there now follow but successive steps. Even the surgeon of today may mistake a soft uterine "fibroid" for a firm ovarian cyst, and it matters little to the patient as regards her safety. But how different the case in 1853 when Walter Burnham of Lowell, instead of an ovarian cyst delivered through his incision an enlarged uterus with its fibroid! What was worse, it could not be replaced; and he was compelled to amputate where he could, this courageous, if reluctant, pioneer. But the honor of the first case, deliberately undertaken, fell to his fellow-townsman, Gilman Kimball.

So was launched the hysterectomy; and, one by one, the increasing difficulties, reaping where ovariotomy had sown, were successfully undertaken. It was all largely the work of the same hands, for we find here Kimball, Burnham, the two Atlees, Peaslee, and Thomas. At first the pediculated tumor only was removed,—a myomectomy; and, in selected cases, for greater safety, the vaginal route was chosen. The younger Atlee, in a Prize Essay, awarded by the American Medical Association, described, in 1853, a vaginal myomectomy, which he began on the eighth of May, and continued at different times, removing the tumor piecemeal,—our first morcellement. He regrets the death of the patient, from pneumonia, in July.

But from the first, the abdominal route was usually preferred.

And now, to these courageous pioneers and their long-suffering patients, there came as a veritable gift from heaven, the general use of Morton's ether anesthesia. Discovered seven years before, the happy word itself is the gift of Oliver Wendell Holmes and Weir Mitchell poetically defines its slumber as "the death of pain."

The names of Marcy, Emmet, Jones, Eastman, Stimson, Byford, Baer, Pryor, and Kelly must always be remembered in the evolution of hysterectomy. One and all, they gave important contributions to make it the perfect operation that it is today.

And at first it must have required a great determination, for we learn from Kimball, in 1853, that in a first eleven hysterectomies, there were but six recoveries. And in this development we do not forget the work in Germany of Gustav Simon, Hegar, Billroth, and Schroeder; and in France, that of Koeberle, Velpeau, and Pean. It was of Velpeau, you remember, that the Breakfast-Table Autocrat said, "a good sound head over a pair of wooden shoes is better than a wooden head over feet in calfskin;" while Pean's name will remain as the inventor of the "artery forceps." But the greatest credit of this operation belongs in all truth to America; and, in recognition of this, Thomas Keith, in dedicating his Monograph on Hysterectomy to Skene of Brooklyn, said, "I offer you something that is not mine, but is of American origin * * * for the first case of uterine fibroid diagnosed before operation, was removed by my old friend, Dr. Kimball."

The gates of abdominal surgery were by this time thrown widely open.

And now let us consider vaginal plastic surgery, a second great achievement.

Emerson has said, "when Nature has work to do, she creates a genius to do it." Certainly Nature did not fail us here, for she gave us Marion Sims.

Until this time, our specialty had barely lived through a struggling adolescence, for while Recamier, in 1801, by the use of his speculum, his sound, and his curette, had at least imparted to it accurate observation; and while, later, Sir James Simpson and Huguier had added substance and stature to its growth; it only came of age with Marion Sims. It remained for him to definitely establish it.

It was in 1855 that the Woman's Hospital, New York, was opened by this Alabama surgeon. This was the first special hospital for women, and the scope of gynecology at the time may be inferred from the speeches of the opposition. Dr. Meredith Reese, a prominent physician, contended that anyone could apply nitrate of silver through a cylindrical speculum; that an astringent injection would cure a leucorrhea; and that there was little difficulty in fitting a Physick globe pessary for a prolapse. He but voiced the recognized limitations, and where was the need of a special hospital!

It remained for Marion Sims to change all this. His preparation had been entirely original and self-taught, in a small hospital of his own in Alabama. The world knows the accident of the pewter spoon as a hardware speculum, his consequent success with bladder fistulæ, and the indifferent health which sent him to New York. "I had no influence and no friends; I said to myself, 'I am a lost man unless I get some one to create a place where I can show the world what I am capable of doing.'" To its lasting credit, New York gave him the place, it gave him a hospital, with Sister Margaret and Thomas Emmet.

To the treatment of these fistulæ, Sims brought in addition to his native genius, three special things: (1) the duck-bill speculum; (2) the funnel form of denudation; and (3) the use of silver wire as sutures. And with these he changed the whole picture from a previous succession of dismal failures to nearly a uniform success.

His principles and methods were speedily adopted, not only in America, but throughout the world. Even on his first visit to Europe, in 1861, his reputation had preceded him, and his advice and skill were everywhere invoked. Honors met him at every turn, and for a time he cared for the late Empress Eugenie at Saint-Cloud. His first book, "Clinical Notes on Uterine Surgery," is really a Genesis, for it distinguishes him at once as the founder of our specialty. But specialist as he was he was also a great generalist, for as an army surgeon

he served with distinction in the Franco-Prussian War, embodying his
experiences in a second great contribution, "The Careful Invasion of
the Peritoneal Cavity for   *   *   *   All Intra-peritoneal Conditions."
His was the greatest reputation ever achieved by an American surgeon.
His statue in bronze stands in Bryant Park, New York, erected by
his "Professional Friends, Loving Patients, and Many Admirers
throughout the World."

Gynecology stands debtor for all time to Marion Sims.

His work, so admirably begun, was ably carried on and further de-
veloped by Emmet, Nathan Bozeman (also of Alabama), by Ferguson,
E. C. Dudley, Goodell, and Storer. Emmet was undoubtedly the great-
est of these. In addition to his abdominal work, he devised an excel-
lent plastic operation for cystocele, rectocele, and complete perineal
tear; while his name, alongside of Schroeder's will remain in our liter-
ature for the repair of cervical laceration.

These, then, were the two great paths—the one first travelled by
McDowell and the other by Marion Sims—along which our special sur-
gery has developed. These two paths found their junction in the
work of Emmet, Gaillard Thomas, Charles P. Noble, and Howard
Kelly, men whose work marks the first milestone on the great highway.

The history of obstetrics in America will always be associated with
the name of Oliver Wendell Holmes. We read that he practiced
medicine but a few years, and enjoyed only a fair practice, and yet he
was the first to recognize the contagious nature of puerperal fever.
In a paper, "On the Contagiousness of Puerperal Fever," published
in 1843, when he was thirty-four, he showed that this "contagium"
was carried from one patient to another. He re-asserted this belief in
a second paper, "Puerperal Fever as a Private Pestilence," and so
pointed the direction of the way; the way of Semmelweiss, in 1847,
who declared that the hands carried particles of "decomposed animal
matter" into the puerperal wound; and the way of Pasteur, the famous
Dean at Lille, who, ten years later, established his famous formula of
fermentation, and showed that "a virus might consist of microscopic
beings." This was the way that led to Joseph Lister, in 1867; for Lis-
terism, it will always be conceded, was the most important application
of Pasteur's work.

Before this time the history of obstetrics in America is the common-
place story of its academic and clinical establishment,—its gradual
emancipation from the hands of the midwives. It was the old world
wide struggle of the obstetrician against prejudice, false modesty, and
tradition.

In France, you remember, as early as the 17th century, Jules Clement
had been called to attend in her confinement, La Valliere, mistress
of the Grand Monarque; and the title "Accoucheur" is bequeathed

to us for his services; while it was William Hunter in England who was the first man to attend at such a time one of England's queens. In America, as late as 1840, Samuel Gregory of Boston is still found inveighing strongly against the "danger and the immorality" of employing men in midwifery.

The men engaged on this emancipation were, from the beginning, the writers and the teachers of the subject; William Shippen, Samuel Bard, Thomas James, Walter Channing, William Potts Dewees, J. W. Francis, C. D. Meigs, and H. L. Hodge. Dewees was an able writer, and the strongest clinician of his time; and we are told that so popular was he in this emancipation of his subject, that the ladies were accustomed to delay their confinements when he was out of town. Hodge gave us his famous pessary, rivalled only by that of Albert Smith; and he published in 1864 his excellent work "The Principles and Practice of Obstetrics." He and Meigs were eminent clinicians and great teachers; yet they were both bitterly opposed to the contagion theory of Holmes, and they denied the use of ether during labor as "it made the patient drunk, and no self-respecting woman would place herself under such an influence." Ether in parturition was first used by Sir James Simpson in 1847, and later in the same year by Keep and Channing of Boston.

As early as 1807 John Stearns had given us the important contribution to obstetrical therapeutics, "The Medicinal Use of Ergot."

While the first cesarean section in America was performed by John Lambert at Newton, Ohio, in 1827, such operations were few, sporadic, and undertaken *in extremis*. The first elective case was performed by Lusk only in 1887, five years after the appearance of Saenger's monograph. Gaillard Thomas, in 1870, executed for the first time in America a laparoelytrotomy, the sound surgical principles of which have been lately vindicated by the various forms of extraperitoneal section. The epoch-making observations of Emil Noeggerath, "Latent Gonorrhea in Women," were published in 1872, five years before Neisser identified the organism.

True it is, and natural enough, that obstetrics had scarcely kept pace with her brilliant surgical offspring. Even the voice of Oliver Wendell Holmes was for long the voice of one crying in the wilderness, and it remained for Tarnier to first employ Lister's carbolic solution in obstetrics.

As we have seen, Lister published his first report in 1867, but it was more than a decade of years before his great principles were generally accepted. For a time he was certainly a prophet without honor in his own country. James Chadwick tells us that he saw Lister operate in 1873, and that "swayed by the scoffings of my preceptors, I failed to grasp the significance of his principles."

Lister's scientific vindication came from Germany, with the work of Robert Koch, in 1876, the natal year of this Society.

With the founding of this Society, obstetrics and gynecology were definitely linked together, the future lay in experienced and skilled hands, and the subsequent story is written in its Transactions.

It is true that the days of the large adventure were over, but the problems of the new inheritance lay everywhere before us.

One by one these problems have been taken up and investigated. Some few have been solved, their solution but discovering a wider world to conquer.

It is interesting to follow here the history of pelvic hematocele; its gradual recognition as an extrauterine gestation through the studies of John S. Parry, Eastman, Joseph Price and Webster. At this time Lawson Tait was in the midst of his vigorous work in Birmingham.

Much of our knowledge of pelvic infection is written here. Battey described his operation in the first volume of the Transactions; and the recognition and surgical treatment of tubal disease was largely the work of the brothers Price, of Johnstone and Dudley. The long and bitter quarrel between pelvic peritonitis and cellulitis was really settled by Gaillard Thomas.

With the decline of the pessary craze the uterus was no longer, in the words of Clifford Allbutt, "impaled on a stem, or perched on a twig." There developed instead the operations for its suspension, the work of Howard Kelly, Gilliam, Simpson, and Webster Baldy. England gave us the Alexander-Adams, and the method of Olshausen came from Germany.

Cesarean section has been variously modified, and its wider indications more clearly defined by Peterson, Davis, Hirst, Newell, and Edgar. The narrower claims of pubiotomy have been measured, and valuable chapters added to the etiology and treatment of the toxemias of pregnancy and puerperal infection.

Important studies have been made in the anatomy of the pelvic floor, noticeably by R. T. Frank; while new and more scientific methods for its repair have been advanced by Babcock, J. Riddle Goffe, Studdiford, and Ward. In this work the flap-splitting methods of Lawson Tait and Hegar have been justly incorporated, and the Wertheim-Watkins' interposition operation has found, in selected cases, a definite place.

Cancer of the uterus has remained an unsolved problem, despite the efforts of Byrne, Emil Ries, Werder, and John G. Clark. Wertheim's results from Vienna roused only vain expectations; and the use of radium is even now undergoing the test of experience.

In 1880, Skene of Brooklyn described the "latent infection" in the suburethral glands, now known by his name; and chief among the

other scientific contributions have been those of Whitridge Williams, Cullen, Reynolds, Taussig, Charles Norris, Brettauer, Gellhorn, Ehrenfest, and Sampson.

As we have seen, it is the work of three centuries.

During these three hundred years there have been three great revivals in medicine: The British, the French, and the German. America has partaken largely from them, has assimilated and made her own the grand ideas of Hunter, of Pasteur, and of Virchow; and the great name of Lister must be added to these. During this time America has herself contributed generously, for she has given anesthesia, together with rich gifts of surgical achievement.

Through all this long inheritance she has steadily pursued her practical, individual way, adapting means to ends, and developing the particular measure of her gift.

And now that her great house is fairly put in order, the time is ripe for more leisurely thought, more concentrated study. The signs of the times are made manifest by the Carnegie and Rockefeller Foundations, the establishment of laboratories, with rich scholarships and endowments. Medical education in its widest sense is an urgent question, and the thoughtful address of Dickinson, our last year's President, has already shown us something of the way.

What it all comes to is this, that we have already contributed to medicine large and handsome gifts of practical things; our time has been largely spent in action. For the future we must concern ourselves with special thinking and research. For it is only with a right conjunction of special thought with action, of science with art, that we can become a growing point, the great growing point of the coming century. It is by taking thought that we shall now add to our stature.

285 Mountain Street.

THE UNSOLVED PROBLEMS IN GYNECOLOGY AND OBSTETRICS*

By W. Blair Bell, B.S., M.D. (Lond.), Liverpool, England

TODAY gynecology and obstetrics stand high among the develop-
ments of surgery along scientific and specialized lines; yet, the
more I think of this, the greater is my wonderment that it should be
so. It seems such a short while since our specialties were struggling
towards the light.

When, therefore, I received your invitation to read a paper before this
learned society it occurred to me that it might not be inappropriate if
I were to consider for a few moments the principal avenue through
which approach may be made to the secrets still hidden from us and
the personnel and equipment required for the task.

I do not think there can be any doubt that the collective status of
the gynecologists and obstetricians of the world in regard to clinical
acumen and surgical technique is nearing the limit which must be set
to human achievement, and that the same will soon obtain in regard
to the bacteriological aspects of our special subjects. But in contra-
distinction to this must be placed the unsatisfactory character of our
advancement, the slow progress we are making, in the more essentially
biological, including biochemical, problems, connected not only with
the normal morphology and physiology of the female genitalia, but
also with the pathological developments that may be associated with
the structure and function of the reproductive organs. Concerning
the actual details of these problems I shall have but little to say, ex-
cept by way of illustration.

First, let me consider how far our present methods of education
are conducive to the correct mental attitude of the future investigator—
whether they are methods that stimulate the powers of perception—
and make every student an interested observer from the beginning.

It is a curious commentary on the value of the allied sciences to the
surgeon of today, that there is a growing tendency—at any rate in
my own country—to minimize the importance of biology and to urge
the superior—I might almost say 'exclusive'—claims of the final hos-
pital study; and this attitude is not confined to the student. This
seems to me unfortunate, for it means that we are catering entirely
for men of moderate intelligence and not at all for those on whom may
fall the responsibility of sustaining progress in our science.

As a result of our existing methods, the clinical aspects of gynecology and obstetrics have been thoroughly illuminated, as I have said, while the more abstruse biological features are but very imperfectly understood and their claims hardly realized. It may be argued that there are many expert physiologists, biochemists and comparative anatomists, and this is true, but alone they cannot help us because they do not yet know our difficulties, neither have they the clinical nor technical knowledge with which to guide their steps. Up to the present the teaching of elementary gynecological anatomy and physiology has been conducted by the clinical instructor, because these subjects have been almost invariably ignored by the physiologist and anatomist. This means, generally speaking, that expert physiologists and anatomists have remained in more or less complete ignorance of these matters, and are, therefore, even now unaware of the hiatuses in our knowledge.

There can be no doubt, I think, that the man who continually has to face difficulties in practice is the one most likely to find the means of circumventing them, provided he have sufficient all-round knowledge and adequate facilities for his task. It is only natural, however, that each should turn his attention to those matters concerning which he is best informed. It is obvious, therefore, that if the many biological problems connected with gynecology and obstetrics, which so far have baffled us, are to be elucidated, we must modify the general plan of education in regard to those who may perchance attempt to throw light on what is now obscure and indistinct.

In attempting to indicate the direction in which improvement may be made, I shall doubtless merely give verbal form to what must already have taken shape in the minds of many.

In our educational methods, we are too apt, I think, to set store on detail. We should, I believe, aim at encouraging a comprehensive and inclusive outlook. We destroy originality by overloading the young mind with so-called facts which often are the easily deducible results of observation. Again, it seems to me that the different subjects of the general curriculum are taught in too disjointed and exclusive a manner. As gynecologists and obstetricians we should have the right—and the same applies to teachers in the other branches of final medical study—of defining the subject-matter of the physiological and anatomical courses. The anatomist should be required to demonstrate and to teach comparative and human anatomy on the lines we desire, and the physiologist should be obliged to lead, by experiment and demonstration in the laboratory, more directly to what will be taught later in regard to the human subject. There must, in fact, be more coördination throughout. It would be better, for instance, if the key-subject, biology, were taught in such a way as to make the student realize that in it Man is included in a wide generalization with the lower animals, and that Man is but the evolutionary physio-

logical and morphological climax. The student should be more definitely impressed with the knowledge that in his biological and biochemical studies he is watching the evolution of Man, that he is following the simple to the complex, and that what may be normal at one stage is pathologic in a higher state of evolution—that hermaphroditism, for example, is normal in the earthworm but abnormal in Man. If the student could be imbued with some conception of the ultimate value of all his biological work, and could be taught not to look upon it as a separate and isolated obstacle to arrest his onward course, not only would his hospital studies be more interesting and more relatively important, but also his mental attitude and outlook would be as much fitted for the investigation of biological as for the study of purely clinical problems.

The present trend, then, of medical education in Great Britain has been towards the production of good clinicians, rather than of men with their minds alive to the biological, morphological and physiological, including biochemical, import of the phenomena they observe.

I often wonder how far this question has been realized in America—this training of the student towards a wider scientific mentality. In Great Britain, where general practitioners are now being urged to coöperate in an investigation concerning the beginnings of disease, it is clear that there is a need of reform in our methods of education if we are to expect results on the lines I have indicated.

Supposing, however, that the student has been educated on these principles, in what circumstances and in what environment will he find inspiration and obtain the best results?

The establishment and success of clinical units and of units for group-study in North America and Canada may provide the answer. Their foundation is, of course, open to the interpretation that these systems have been brought into existence because the brain of the average intelligent man is incapable of grasping and understanding all the side-issues that go to make up the sum of medical knowledge; and I have heard it stated by an advocate of them that this is their *raison d'etre*. Moreover, it is said that only in them can material properly be utilized and the one-line worker find an immediate use for his output. While the last part of this statement is true, I cannot agree entirely with the first. A properly educated man of wide perception is not necessarily a man of encyclopedic knowledge, but, rather, one whose mind is so saturated with basic principles that the mosaic of detail falls into an orderly pattern under the influence of his prescient intelligence. A man with the index type of mind is rarely original, and is not, therefore, necessarily worthy of encouragement. I have already referred to this in regard to the education of the student.

Hunters and Pasteurs are, of course, born, not made, but I believe that useful imitations can be developed by proper education and training,—imitations good enough, in the helpful environment of which I have just spoken, to obtain results. Because the great biological and medical discoveries in the past have emanated from the brains of men ploughing a lonely furrow, there is no inherent reason why men of similar intellect should not again arise and in the more perfect environment that can be assured today unravel the outstanding questions. Meanwhile it should be possible now for men of lesser ability with proper education and in a helpful environment to surmount difficulties which the master-minds of the past, with their more limited opportunities, could not overcome.

I would once more urge the importance, so well recognized in this country, of clinical work going hand in hand with scientific laboratory investigations. You have many wise foundations for this purpose, whereas we are sadly handicapped for want of them.

In this continent there is offered to the well-educated man every opportunity for attacking these problems at a living wage; but in Great Britain we cannot always secure the best men for the service of science, for we are unable to offer them a reasonable financial reward, a reward in any way commensurate with that to be obtained from practice. This is a matter that is exercising us greatly, for times are changing, and while clinical matters are so well established that they can take care of themselves, there is urgent need that further progress, which, as I have stated, is largely biological, should not be crippled and hampered for want of proper organization in teaching and postgraduate research.

If, then, the last ramparts of gynecological and obstetrical diseases are to be captured we must modify to some extent our methods of education and we must bring correlation, breadth, and inspiration into the musty empiricism of the preliminary studies. I know the curriculum is overcrowded, but it is mostly with what could well be spared. We must, also, encourage scientific enterprise, and, after educating our students for their lifework, give them the opportunity of utilizing their talents and of advancing the science of obstetrics and gynecology.

I shall now endeavour briefly to substantiate my statement that the great outstanding problems in gynecology and obstetrics are biological in the narrowest sense of the word.

MORPHOLOGICAL PROBLEMS

The development of the human ovary can now be described with a considerable degree of certainty, but the same cannot be said in regard to that of the genital passages. To what factors, for instance, is

due the fusion of the Müllerian ducts in the genital cord? This is of considerable importance in connection with the common so-called malformations of the uterus and vagina. Professor Wood Jones, who has done so much excellent work on the comparative anatomy of the genital organs, believes that we should look upon these conditions of imperfect union as atavisms rather than malformations; and in this light the comparative anatomy of the genitalia becomes both interesting and instructive. Indeed, it is from this point of view alone that information can be obtained. If serial sections be cut of the divided and uniting uterine horns in various species of rodentia and carnivora, all the later stages in the development of the human uterus may be seen. Moreover, it will be made clear that the human uterus has morphologically but two muscular coats, not three, as usually described. Nevertheless, we do not yet know what determines the final development of the human uterus, and we can hardly expect to know until we have decided definitely what are the variations in the factors that lead to the different degrees of Müllerian union that are normal, constant phenomena in closely related animals. In rodentia there may be seen the complete didelphic condition with double vagina (viscacha) and the gradual evolution to the single vagina and bicornute uterus (aguti).

Again, can the peritoneal pouch that encloses the ovarian extremity of the tube and ovary itself, a structure seen in certain rodents, and, as I have found in a less complete form in hedgehogs, be passed over as a freak structure, in spite of the fact that, as Bland-Sutton has shown, it may exist as an atavism in woman? It seems to me that a structure so useful to fertilization and conception is worthy of serious study, especially from the point of view of the state of peritoneal currents and other influences in the creatures concerned. An investigation concerning the nature of the secretion of these sacs would also be of considerable interest.

Let me take another matter which, possibly, is of more clinical importance. How far are we familiar with the causes of the irregularities in the female bony pelvis, apart from those resulting from gross postnatal disease, such as rickets? We talk about civilization, athletics and the rest, but what causes a generally contracted pelvis in a well-developed non-rachitic woman who has been guilty of none of the enterprises that militate against functional perfection.

The work of Whitridge Williams and others has demonstrated beyond reasonable doubt that the typical funnel-shaped pelvis is associated with high assimilation, but I do not think the cause of high assimilation is definitely known. Such an important matter, especially in this country, is deserving of extensive systematic investigation. Comparative racial studies, in which different races were examined in their natural environments, might throw considerable light on this and on other pelvic ab-

normalities, for there can be no doubt that civilization may greatly affect structure as well as function.

As a last morphological point of interest, albeit there are many others, let me say that I look forward to the day when some gynecologist or obstetrician will give us the clue to the mode of origin of pathological neoplasms. After all, the gynecologist and obstetrician has, time and again, given a lead to the rest of the profession, and in the problem to which I refer he is on his own ground, for his work is chiefly concerned with the preservation of the structures and functions through the medium of which neoplastic developments normally occur.

PHYSIOLOGICAL PROBLEMS

It is within the last twenty years that practically all the recognized facts concerning the female functions have been discovered. We now know, if I may quote one of my own aphorisms, that a woman is a woman on account of all her internal secretions, and not only because she possesses ovaries. But we still lack certain evidence as to the nature of the controlling force that determines the primary sex-characteristics of the person concerned; nor do we know how it comes about that even in the course of development a conjunction of sex-characteristics may occur—a condition of hermaphroditism. Even if it be that the masculinity or femininity balance of the internal secretions is disturbed, this is still an effect, not a cause. That this fascinating and intricate problem is capable of solution I am convinced. It may well be the life-work of some one capable of estimating the gradual changes through the numerous classes of creatures that indicate the evolutionary origin of Man, of some comparative morphologist with all the histological technique of the present at his disposal on which to graft new methods of observation; and then, when the gross serial steps have been demonstrated, he may perchance gain an inkling of that on which they depend—an inkling of the forces which imbue the fertilized ovum of Man with maleness and femaleness.

There are few, surely, who cannot recognize today the vast importance of femaleness as opposed to maleness, and few, too, who are not conversant with the essential physiological, that is to say, biochemical, differences that influence the mind and body.

We have, too, some knowledge of what constitutes puberty. It is, we believe, the time of life when the metabolism has met the claims of somatic growth. The potentiality of a girl's metabolic resources, especially in regard to the calcium salts, at this time is such that it can support the strain of reproduction and all that this involves. But we do not know what happens at puberty to start the new train of events. What is the hormone that makes the ovary aware of the situation; is it then that the genital functions of the ductless glands come into being, and, if so, what leads to this awakening? That it is not a habit of life

is too obvious to need discussion: it is due, rather, to a series of chemical events closely connected, as I believe with the calcium metabolism that may be altered and delayed by many circumstances of nutrition and environment.

Then again, have we established without the possibility of fallacy the nature of menstruation? My view that it is an excretory process in regard to the principal elements required during pregnancy for the building up of the fetus, and during lactation for the formation of milk, as is made evident by the calcium metabolism, requires full confirmation and elaboration in regard to the exact part played by the ovaries and other internal secretions.

To pass on, I would ask whether there is general agreement concerning the factors involved in the production of the climacteric? I myself, for instance, disagree with those who think that the normal menopause is the result of primary ovarian atrophy, although many of the phenomena of the menopause are due to this change. The fact that the artificial menopause is produced by oöphorectomy has been a blind to all of us. If the ovaries are removed from a young woman with protracted amenorrhea and ovarian insufficiency, menopausal symptoms do not supervene. The artificial menopause is induced only when there has been preexisting ovarian activity. At the commencement of the normal menopause the ovaries are normal and active; indeed, at the end of that phenomenon the woman may be capable of conception. Why it is that ovarian substance or extract of any kind, and in any combination whatever and however administered, does not produce specific results at the physiological menopause, whereas whole gland ovarian substance, especially in association with thyroid substance, gives relief in cases in which the menopause has been induced by operative procedures? There are some, I know, who will dispute this; but I believe the facts, as I have stated them, to be true. From this jumble—shall I say?—of observations, it appears justifiable to ask you to consider as a working hypothesis for further investigations the view that there is at the climacteric some substance circulating in the blood, some natural biochemical toxin, or something withdrawn from it, which leads not only to ovarian atrophy but also to the other physiological and structural alterations that take place at the 'change of life.'

Another group of important correlated functions about which we know but little is that concerned with fertilization and conception. I think that light will soon be shed on that curious anomaly I call 'selective sterility.' In view of recent additions to our knowledge in regard to the incompatibility of the blood of persons in different groups, it is not unlikely that selective sterility, as well as successful homoplastic, as opposed to autoplastic, ovarian grafting, will be found to depend on a similar phenomenon. I have observed, however, that a

difference in the blood-grouping of married couples has no direct relation to the possibility, or otherwise, of conception.

Again, the normal interrelations that exist between the mother and the fetus *in utero* have been studied to some purpose; but we are still ignorant of the way in which the growing embryo controls the development of the chorionic epithelium that sometimes takes on such disastrous activity when the control is removed.

I do not think the theory that in such circumstances there is lutein over-growth is sufficient, for it is common to see vesicular mole and chorionepithelioma without abnormal lutein development.

Moreover, how little we know concerning the toxemias of pregnancy! Before we can arrive at any proper idea of the disturbance produced, we must know far more intimately the normal metabolic mechanism concerned and the maternal forces that are marshalled against the deleterious effects produced by what is, after all, a new growth in the uterus. If the recent work of Dold and Obata concerning eclampsia be correct, as seems possible, we shall be placed in possession of very interesting information concerning a biological phenomenon of vast importance, for I do not doubt that, if it be fully confirmed, we shall be able to test the blood of every pregnant woman before so serious a condition as eclampsia supervenes and to treat her with normal human serum. I have myself seen excellent results with blood-transfusion.

Although hundreds of thousands of human beings are expelled from the uterus daily, we have but a faint glimmering of the biochemical factors leading to the termination of parturition. Is it a gradual or sudden increase in the infundibulin content of the blood? And what of lactation? Is the mechanism of the simple nature I have described in the 'Sex Complex'? If so, we are little in advance of the ancients who, owing to their powers of perception, have always been worthy of consideration in matters of priority.

Such gynecological and obstetrical problems seem to me almost infinite when I let my mind wander around the outposts of our small impregnable position of certain knowledge. I have, however, today the desire to emphasize not only the importance of these unsolved problems, which we all admit, but also the essential biological nature of them. I have attempted, too, to show that our education tends to drive us forward almost entirely along the deeply trodden paths rather than along those barely to be seen or yet uncut through virgin country. I would plead, therefore, that our students and our postgraduates be more broadly educated at least in the great principles of biology, for I believe that only by way of physiological, especially biochemical, research, and by the comparative study of simpler forms of structure shall we be able to bring our art towards scientific perfection.

THE FREQUENCY AND CAUSE OF ABORTION

By Arthur William Meyer, M.D., Palo Alto, Cal.

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ONE need only to regard the question of abortion historically and recall the practices of primitive races, to be reminded of the fact that in such a matter as this, human custom, conduct and frailty play a very large rôle. Nor need attention be directed to the practices of primitive or uncivilized peoples. Robinson (1919) for example, estimated that 1,000,000 criminal abortions are performed annually in the United States. However, since the annual number of births in the United States, estimated on the basis of the registration area, is only about 2,400,000 this would imply that one criminal abortion is performed for every two and a half births. Or to put it another way, if somewhat less than 40 per cent of all pregnancies terminate prematurely, as Pearson (1906) estimated, then, according to Robinson, one out of every four pregnancies is terminated *criminally*.

The highest estimates of the ratio of interrupted to uninterrupted pregnancies are those of Taussig (1910) and myself. Those of Taussig were based upon the experience at a St. Louis gynecological clinic, and mine upon about 700 selected histories accompanying specimens in the Carnegie Embryological Collection. From these data it seems that there is one abortion to 1.7-2.3 pregnancies. Hence, if we accept Robinson's estimate of the incidence of criminal abortion in the United States as one to every 2.4 births, it would follow that in the women considered by Taussig or myself, about 50 per cent of all pregnancies which terminated prematurely were terminated criminally! Furthermore, upon the basis of Pearson's estimated prenatal mortality, the criminally induced would somewhat exceed this percentage and upon the basis of Mall's earlier estimate of a prenatal mortality of about 20 per cent, the criminal abortions in the United States, as estimated by Robinson, actually would exceed the grand total of abortions from all causes.

It is regrettable that we are left partly to surmise the exact incidence of prenatal death. Ahlfeld (1898), estimated that there is one abortion for every four or five normal births. This would be one to every five or six pregnancies. Hegar (1863), estimated that one out of eight or ten pregnancies ends prematurely. Michailoff (1897), as reported by Chazan (1904), gave a frequency of 10.18 per cent, and Keyssner, (1895), a frequency of 15.1 per cent. The latter estimate of one abortion to about every 6.6 births, is concurred in also by Wil-

liams (1916), who placed its incidence somewhat higher, or one abortion in every five or six births. According to Chazan, and Lechler (1883), this was the figure reached also by Busch and Moser (1840), upon theoretical grounds alone, although Pearson (1906) decided for a mortality of 37.6 per cent, or one abortion in every 2.7 pregnancies, upon the same basis.

Since the causes responsible for postnatal mortality differ so widely from those which operate before birth, it is unlikely, however, that a curve of adult mortality, if extended through prenatal life back to conception, as done by Busch and Moser and by Pearson, would represent the facts. Indeed, it could do so only by the merest chance for the curve of postnatal mortality is based upon a totally different set of conditions. Besides, it undoubtedly is true that the rate of mortality varies from month to month in prenatal, much as it does from decade to decade in postnatal life, although probably in a totally different way. It could fail to do so only if a perfect uniformity in conditions obtained throughout the period of gestation.

Mall (1917), regarded Pearson's estimate as too low. This opinion of Mall would seem to be confirmed by Taussig (1910), who, from data obtained in 201 gynecological dispensary patients, concluded that there was one abortion to every 2.3 pregnancies, a mortality of 43.4 per cent; and also by the present series of almost 700 cases, which indicates a prenatal mortality of 58 per cent. However, Stumpf (1892), found one abortion for every 3.56 pregnancies, a mortality of but 28 per cent, and Keyssner still less, or one abortion in 9 pregnancies or a mortality of but 11 per cent.

If we accept the statement of certain social workers or propagandists, who allege that a conservative estimate of the total number of criminal abortions annually performed in the United States is 250,000, then on the basis of Pearson, about one in every 6; and on the basis of Mall's earlier estimate, one in every three interrupted pregnancies, is terminated criminally. These estimates are not confirmed, however, by Taussig, (1910), who on the basis of histories obtained from 293 patients at a St. Louis gynecological dispensary reported that only 36 out of 371, or approximately 10 per cent of the abortions in these women were admittedly mechanical. The histories in the Carnegie Embryological Collection present evidence similar to that of Taussig, but these percentages undoubtedly must be regarded as too low, for reasons that will occur to everyone. However, it should not be overlooked that the surprisingly high percentages of prenatal mortality in the above women undoubtedly do not represent the actual life conditions of the whole population. At best they merely indicate the conditions in women who have aborted. How much the inclusion of all those women who never had aborted would have lowered these percentages it is impossible to say, but one scarcely can doubt that this lowering

would be considerable. After a fuller consideration of the literature, Schultz (1921), estimated the prenatal mortality among the general population at 22 per cent, a figure somewhat higher than Mall's earlier, but considerable below his later estimate.

Since the women in the present series do not constitute a dispensary group, but very largely also represent cases in private practice, one cannot contemplate the amazing prenatal mortality revealed by these data without the profoundest concern, not alone because of its effect upon the birth rate, but also because of its relation to the wellbeing of the women wholly aside from the question of morals. Nor can one be quite certain that the indicated antenatal mortality is on the decrease or that it is high in these women alone. Malin (1903), for example, believed that abortion is more common among the economically more fortunate classes. This opinion seems to be shared also by others. Nothing even remotely like it seems to be known in the case of the domestic animals except in such conditions as contagious abortion. Aside from this affection, abortion in some domestic animals seems to be a rather rare phenomenon, having occurred, according to Malins, but 131 times in a series of pregnancies which resulted in 3710 living colts. This is a ratio of only one abortion to every 29.1 pregnancies or less than one seventeenth the frequency in the women of the present series.

But it is very clear that we lack sufficient data upon which to base reliable opinions regarding these matters. Social workers undoubtedly far overestimate the prevalence of criminal abortion, though it should at once be admitted that the professional obstetricians very likely underestimate its frequency, for their opinion is based upon a rather different experience. However, that the estimate of the former is entirely too high can be shown also by their estimate of deaths of mothers ascribed to abortion. It has been stated publicly, for example, by enthusiasts for birth control, that there are 8,000 deaths due to abortions annually in New York alone, and 50,000 in the entire country. Since the total number of deaths from all causes among all women between the ages of 15 and 40, regardless of whether they are childbearing women or not, as estimated on the basis of the registration area according to the U. S. Census for 1916, was only 139,642, one-third of all deaths in women of these ages, according to birth control advocates, was due to criminal abortion!

No mention was made of the occurrence of previous abortion in 11.4 per cent of the 697 selected cases considered more fully here because the clinical histories were quite complete and apparently reliable. However, only three cases among 697 were specifically stated to have suffered no previous abortions. In the rest of the 11.4 per cent the matter was not recorded. Only one of these three women had borne children and the remaining two were recorded as neither having had previous abortions nor children. This small percentage of women who had

not aborted stands in marked contrast to the findings of Malins (1903), who stated that 63.4 per cent of the women in a selected series of 2,000 hospital and private cases had not aborted before.

Malins, who found 14.2 per cent sterile women in a series of 2,000 selected private and hospital cases, stated that only 3.1 per cent of these had aborted or were childless.

Although it is not recorded in 78 cases in the present series whether the women had either children or abortions, one cannot assume that they had neither, otherwise the percentage of primiparae in this series would be 11.4 as compared to 4.86 per cent in the series of Franz (1898). Graefe (1896) found only two out of 38 cases in primiparae, or 5.5 per cent, and stated that Lithauer found only one such case! However, such small groups as these cannot contribute anything of statistical value except when combined. Out of Hellier's series of 1890 married women belonging to the laboring classes, 184, or over 10 per cent, never had been pregnant before, and 1616, or 89.2 per cent—had one or more previous abortions. The latter was true in 92.9 per cent of the cases in the Carnegie series, and although repeated abortions occurred in a considerable percentage of these women, only 5.6 per cent had aborted more than five times.

The above 78 cases also represent the women in this series of 697 cases who may not have aborted previously, that is, before they came to the attention of the Carnegie Laboratory. However, all of them had aborted once or they manifestly would not be represented in this series from the Carnegie Collection. The only exceptions to this statement may be formed by a few instances of spurious pregnancy in which hemorrhage or membranous dysmenorrhea or hypertrophy of the endometrium may have been taken for genuine evidence of pregnancy because of the irregularity in the menstrual history.

A single previous abortion had occurred in 56.6 per cent of 608 cases, and two previous abortions in 22.9 per cent. About 79 per cent of this series, as contrasted with the 66 per cent of Stumpf's series of 446 cases, had aborted once or twice previously and 69.1 per cent once or twice only. Hence the great majority of the specimens in the present series came from cases of first and second abortions. However, one should, I presume, recall in this connection that it always is easy for a woman to say that she has aborted only once or not at all. Yet the records probably are not very defective in this regard for, as will appear later, most of the women were relatively young.

Since 394 out of 692 women, or 56.9 per cent, aborted before the beginning of the fourth month of gestation, it is evident that most of the conceptuses from this series are small. Only three of these women aborted during the last two months and 78.6 per cent before the beginning of the fifth month. The marked increase in the frequency of abortion from the first to the second month, as well as the marked

decrease from the sixth to the seventh month, is not without significance. The same factor probably is at least partially responsible for both. Knowledge confirmatory of the fact that she is pregnant would come to a woman with advent of the second month, while the viability of the fetus or even fetal movements, would act as a deterrent to interference with the gestation especially from the sixth month on.

Only 33.4 per cent of the women of this series aborted in the third month, as compared to 59 per cent in the series of Dührssen (1887), and to 42.7 per cent of Franz's 1842 cases taken from the first seven months of gestation. Since only three of the present series of 692 cases aborted during the last two months and only 14 during the last three months, it is quite immaterial whether or not the cases in this series from the last three months are included, for 98.2 per cent aborted before the seventh month. Although Franz stated that only 15.45 per cent of the cases collected by him had aborted before the 28th week, the summary given at the end of his paper would seem to make this percentage 76.9 per cent, which compares fairly well with the 98.2 per cent found in this series.

That no existing collection of specimens or of histories correctly represents the actual facts in the world at large, would seem to be indicated by a comparison of the results obtained by different investigators. With the exception of the results of Stumpf and myself and some of those of Lechler, for the third, fifth, sixth and seventh months, the divergences are striking,—probably irreconcilable,— and suggest that a far larger series of cases than that dealt with at present, is necessary before results closely approximating the truth can be obtained. The only regard in which the findings of Franz, Hellier, Stumpf, and myself, are in surprising agreement, is in the average number of full term pregnancies and abortions per woman. This was 4.77 in Franz's; 4.59 in Hellier's; 4.15 in Stumpf's; and 4.58 in the present series. Since these four series included 3752 women, it would seem that one can assume that the average of these groups, or 4.54 full term pregnancies and abortions per woman, probably approaches the truth very closely indeed. Hellier's group came largely from the laboring classes of Leeds, while the Carnegie series comprises women from widely different stations in life and from widely scattered communities. Those of Franz and Stumpf came from different regions of the European continent. The truly remarkable agreement found in women from three countries seems to imply that the number of births and abortions per woman, is largely if not wholly, independent of nationality, social status, and environment.

A very large proportion of the women in the histories of which the matter was recorded, were childless. This was the case in 143 out of 585 cases, or in 24.4 per cent, but Hellier found the childless to form only 1.3 per cent of his series of 1800 gynecologic cases from

among the working classes of Leeds. Approximately the same percentage of the present series as was childless had but one child. A somewhat smaller number had two children, the childless and those who had one and two children forming 67.1 per cent of the whole group. Yet, one woman had borne 14 and another 16 times.

Franz found that primiparae formed only 4.86 per cent of his series of 844 cases, but if we could assume that all the cases in the Carnegie series which were reported as childless actually were primiparae, then the percentage of the latter in this collection would be 24.7 per cent. However, since such a marked discrepancy exists between the percentage recorded by Franz and the latter figure, it is more than likely that a considerable number of the women recorded as childless in this series, were not primiparae after all. This is indicated also by the fact that only 78 out of 697 women, or 11.2 per cent were unrecorded as to offspring or previous abortions. Only two additional cases were recorded as not having suffered an abortion previously. Consequently only 80 out of these 697 women or 12.9 per cent *apparently* were in their first pregnancy.

Franz found abortion twice as common in multiparae as in nulliparae. From clinical cases Graefe (1896) concluded that women who had borne three times aborted most frequently, but he added that this finding was not confirmed in his private practice. Stumpf found the ratio of abortion to birth one to 5.1 in primiparae but one to 2.21 in multiparae having up to and including five children and one to 2.22 in multiparae having more than five children. In the Carnegie series the average number of abortions per woman was practically the same in the childless and in those having had one child but with the second child, a rise of almost 27 per cent takes place, for the average number of abortions per woman changes from 2.5 to 2.9. Another smaller advance seems to occur with the fourth child although there are but relatively slight fluctuations in women having had four to seven children. Since the number of women having borne eight, nine, and ten children was small, no conclusions could be drawn regarding them.

In all groups except the first two, composed of women having none, or but one child, the average number of abortions lies between 2.9 and 3.6 per woman. Moreover, this ratio is practically the same in the groups having borne two, four, and even six children, but since the total number of cases was only 585, the number in each group necessarily is small, being over 100 in the first three groups only.

Upon comparing the total number of previous abortions suffered by 697 women, with the total number of children borne by them, we find that there was 0.84 previous abortion for every child. However, if the 697 abortions which caused these women to be represented in the Carnegie Collection be included, then the ratio becomes 1.3 instead

of 0.84 abortion per child. However, Malins, on the basis of 2,000 selected private and hospital cases, found but one abortion to every five children. A similar proportion is recorded also by Hellier, who, on the basis of 6974 births and 1288 abortions in 1800 married women, found one abortion for every 5.5 child. Keyssner (1895), on the basis of 9381 births and 1194 abortions, found a ratio of but one abortion to every eight births. Although the statistics of Keyssner were taken from the clinics, polyclinics, and from gynecologic journals, and those of Malins from selected private and hospital cases, one is at a loss to explain the great disparity between them and those in the present series.

In this series of 697 women with 1351 children and 1843 abortions, there were 1.3 abortions for every child or one abortion for every 1.7 pregnancies. This result differs somewhat from that recorded by Taussig, for the cases in the St. Louis Gynecological Clinic, which was one abortion for every 2.3 pregnancies. The lack of a closer correspondence between the estimate made by Taussig and that in the present series, is not surprising for the Carnegie series is fairly representative, being composed to a considerable extent of material obtained from the general practitioner. However it is surprising to find that the ratio of children to abortions is lower in these women than in the cases from a dispensary, unless we accept the doubtful opinion that abortion is, after all, more common among the economically more favored classes.

The relative constancy in the ratio of abortions to children in families with three to seven children, seems to imply that whatever the factors responsible for the interruption of pregnancy, they act with unexpected regularity in women of widely differing ages and with decidedly different reproductive histories. Moreover, this fact would seem to imply that in these women there is no tendency to limit the family to any particular number of children through interference with the gestation, for were such the case, abortion should be most frequent in connection with the particular number of children to which it is attempted to restrict the size of the family through the termination of pregnancy. This could fail to be true only if we could assume that such a limitation of the size of the family is due to causes other than interference with the gestation.

Only 29.1 per cent of the 607 women whose ages were given, were less than 25 years old, but 56.1 per cent were less than 30, and 77.4 per cent less than 35 years. In the series of Stumpf this was true of 23.3, 51.7 and 71.8 per cent of the women, respectively. Upon considering the relation of the different age groups nothing unusual appears. The average number of abortions per child is highest in the 15 to 19 year group, in which it is 4.8. In the 20 to 24 year group it dropped to 1.6 abortions per child and then, as might be expected, a gradual

decrease occurs in each half-decade, from 15 to 50 years, in which it is 0.14.

The number of abortions per woman ranges from 1.1 in the 15 to 19 year group to 2.7 in the 40 to 44 year group. There is a decided drop in this average in the 45 to 49 year group, but since this group contains only three cases. it must be disregarded. In the 15 to 19 and the 20 to 24 year groups, the average number of abortions per woman exceeds the average number of children, but after that the reverse is true, these ratios being almost equal in the 25 to 29 and 30 to 34 year groups. The greatest disproportion between abortions and children is reached in the 40 to 44 year group in which the ratio is 2.08 children for every abortion.

Taussig found 870 full term births in 293 women, the average number of children per woman being 2.9, which is considerably higher, than the average of 1.9 in this series of 697 women. The average number of abortions in 201 women was 1.8, instead of 2.6 as in this series. Hellier (1901), found that 1800 selected married women had borne 6974 children or an average of 3.87 each, and in Franz's series of 4255 women the average number of children per women was still higher, or 4.77.

The series of 446 cases of Stumpf form a striking contrast to the present one, for although the total number of cases of pregnancy in essentially the above age-groups ranges from 89 in the group over 40 to 365 in the 25 to 30 year group, the ratio of abortions per pregnancy differed markedly. Aside from the entire lack of correspondence between the two sets of percentages shown there, especially as far as women below 20 are concerned, in whom the difference is practically 1600 per cent, Stumpf found two maxima of abortions to births instead of a steady decline as in the Carnegie series. Stumpf's first maximum occurred between 26 and 30, and the second after 40. It also is peculiar that although Stumpf's ratios of abortions to births are 200 to 1600 per cent below mine in women below 40 years, they are 200 per cent higher than mine in women beyond these years. Since the discrepancies are so great, it is very likely that a number of unknown factors are involved and it hardly is worth while to try to reconcile them.

The 21 admittedly unmarried women in this series had 25 abortions or 1.2 abortion per woman, and 11 children or 0.5 child each. Both of these figures are below the average for the professedly married women, yet as might be surmised, the ratio of abortions to children is considerably higher in the group of the unmarried, than in all groups of the married except the 15 to 19 group. It is 2.2 abortions per child. It is strange that the average number of abortions per child in the 15 to 19 year group of professedly married women is more than twice as high as in the small group of the unmarried. Were these groups

larger one could conclude that there is something in the marital relationship of women of these years, or in the attitude toward abortion on the part of the married, which is responsible for this difference.

In contrasting the number of abortions per woman in 344 women giving birth to conceptuses classed as normal, with those suffered by 264 women who aborted conceptuses classed as pathologic, we find that the former had sustained an average of 1.7 abortions, and the latter only 1.79, or practically the same number. However, a slight tendency to earlier abortion of pathologic conceptuses is indicated. Yet abortion of conceptuses classed as pathologic strangely enough seems to have had no discernible effect in reducing the average number of children per woman. This, of course, is contrary to what one should expect, and undoubtedly contrary also to the facts. The 256 women giving birth to conceptuses classed as pathologic, really had more children on an average than the 337 who had aborted conceptuses classed as normal, for women giving birth to conceptuses classed as pathologic had an average of 2.3 children, but those aborting conceptuses classed as normal only 2.1 children. Hence, one would seem to be led to the startling and impossible conclusion that pathogenicity of the conceptus, whatever its cause, does not reduce, but enhances fertility! It may be recalled in this connection that Hellier found that 96.5 per cent of the 1800 married women who had abortions "almost up to the maximum", nevertheless later bore one or more children, but the explanation for the above anomalous and self-contradictory result, probably lies in the fact that many conceptuses classed as pathologic, very likely merely are macerated normal specimens, the form of which was changed in the course of long retention.

The women aborting conceptuses classed as pathologic, aborted somewhat earlier, for 86.7 per cent of them aborted before the beginning of the fifth month of gestation, as compared with 76.5 per cent of those who aborted specimens classed as normal. Since the groups contain 402 normal and 290 pathologic cases, this difference in percentages of early abortions might seem to imply that conceptuses classed as pathologic actually had developed under unfavorable conditions, died and were aborted sooner. Since, as previously stated, most of these are young, while those classed as normal are relatively older, one may assume that young conceptuses are retained relatively longer after death than older ones. This conclusion is borne out also upon comparing the menstrual with the estimated or anatomic ages of specimens grouped as normal and pathologic. From such a comparison it is evident that the specimens classed as pathologic were retained relatively longer after death than those classed as normal, and that had they been aborted as soon after their death as were those classed as normal, a larger percentge of them would have been aborted before the fifth menstrual month than actually was the case.

Fifty per cent of the women aborting conceptuses classed as pathologic and 60.9 per cent of those aborting conceptuses classed as normal were below 30 years of age. Hence the women aborting conceptuses classed as pathologic would seem to have been somewhat older.

Upon contrasting the conditions in the small group of negro women included here with that of the white women, one is not justified in drawing any definite conclusion regarding the possibility of racial differences, because the group of negro women is so small, but it nevertheless strikes one's attention that self-induction of abortion is unrecorded among them. Psychic and accidental, mechanical causes also are unrecorded. Therapeutic intervention occurred in only 1.3 per cent of the colored women, but in 6.6 per cent of the white. Families of single children seem to be rarer among these negro women, although according to our last national census the average family among negroes in cities of a population of 10,000 and over, is somewhat smaller than that among whites, with the exception of the cities of Baltimore and Washington. This was true also of this series, for the average number of children was less in the negro women, although they did not differ materially in age grouping.

Abortions among the colored women also seemed to fall somewhat later in the gestation than among the white, only 65.4 per cent of them aborting before the fifth month, as contrasted with 79.7 per cent of the white women. This difference may be due to more prompt interference on the part of white women, rather than to fundamental biologic differences.

Could one take the figures deduced from the records of specimens classed as pathologic at their face value, one would be justified in concluding that but a very small percentage of the abortions here concerned were due to interference on the part of the patient. It also must be remembered that a smaller proportion of abortuses classed as pathologic than of those grouped as normal, probably are interfered with by the patient. This follows from the supposition that a normal gestation may be presumed to continue uninterrupted far more frequently than a pathologic one, a statement made also by Giacomini and Mall.

Abortion was recorded as self-induced in approximately 34 per cent of 198 histories selected from the Carnegie Collection, in which other causes than diseases are mentioned. But these percentages do not truly represent the situation, for such interference no doubt occurred in a far larger percentage of cases, because physicians are disinclined to record and report, and patients still more disinclined to state such a fact. Moreover, that the alleged causes not always are the true ones, is a matter of common knowledge.

The interference was alleged to have been medicinal in only two of these cases. In the rest it was said to have been mechanical. This

was true of 68 out of 90 cases in which the termination of the gestation was alleged to have been due to medicinal, accidental, or psychic causes or to mechanical interference on the part of the patient. This is a percentage of 70.8. Associated diseases were mentioned in only 54 out of 252 cases or in 21.4 per cent. The abortion was recorded as having been spontaneous in two cases only, although no cause was recorded in 463 of the 697 cases. Therapeutic abortions formed 24.7 per cent of those in which a cause was assigned.

A comparison of the part played by various alleged causes of abortion as recorded in histories classed as normal and pathologic shows that tumors and displacements of the uterus are recorded more frequently as a cause of abortion among specimens classed as normal and self-induction more frequently among those classed as pathologic. A higher percentage of the latter were associated with diseases, and miscellaneous and psychic causes of abortion also were recorded more frequently among them. Interference might be presumed to occur more frequently in cases involving pathologic conditions, yet it is recorded more frequently in connection with conceptuses classed as normal. It is not unlikely that the explanation given for the apparent increase of fertility with abortion applies also to this contradictory result. However, therapeutic intervention was somewhat more common among the pathologic, in a somewhat larger percentage of which no cause for the termination of pregnancy was assigned. The latter was the case in 76.6 per cent of 264 pathologic and in 63.3 per cent of 344 normal cases out of a total of 608. Miscellaneous causes, such as exertion, purgative drugs, coitus, etc., were assigned as frequently in the one as in the other class of cases, but the total number in each group is so small that these percentages probably are not very reliable.

That the abortion was inevitable in many, even if not in the majority of the so-called spontaneous or habitual cases, is corroborated by the fact that most of the abortuses in the pathologic division are young, by far the greater majority of the older fetuses falling among the normal. Moreover, many of the larger conceptuses also were received fresh and, in the case of those which were received in consequence of such complications of pregnancy as toxemia, pernicious vomiting, placenta previa, febrile conditions and other pathologic conditions, these facts are recorded.

There often is no way of accounting for the termination of the so-called spontaneous cases from an examination of the conceptuses alone. However, it was very interesting to find frequently that the chorionic vesicle and also the decidua of these abortuses had undergone pronounced changes in abortions which were reported as spontaneous. Many of these fell into the first four groups of Mall's classification and showed the presence of hydatiform degeneration, thus contradicting the statement of Hegar (1904) that hydatiform moles

almost invariably occur only later in pregnancy and confirming Solowij (1899) who claimed that clinical experience teaches that hydatiform moles are aborted *in toto* only in the first months of pregnancy.

Indeed, pathologic conditions of the chorion and decidua seem to be especially frequent causes for the termination of pregnancy during the early months, although one must recall that decidual and possibly chorionic changes may be the consequence of previous interference alone. It long may remain impossible to determine the true or original cause of antenatal death, for the secondary or immediate cause may completely mislead one. Hegar (1902) concluded that the cause of abortion not infrequently lies in the decidua alone and that the death of the cyema usually can be shown to be due to degenerate changes in the villi. He came to this conclusion because he found no evidence of pathologic changes in the chorions of some abortuses. That endometritis and other uterine conditions pre-existent to implantation may be responsible, especially for early abortions, one cannot doubt, for the changes in the endometrium and decidua frequently seem to be so profound.

Certain minor alleged causes of abortion to which recourse is had by patients recur so frequently in the histories, that this fact alone suggests that they probably are not the true or ultimate causes. Among such, a slip or a slight fall usually on the stairs, and minor psychic disturbances may be cited. That psychic disturbances may interrupt gestation seems quite likely, but they probably merely are the immediate, not the ultimate cause of the abortion. They could be regarded as the ultimate cause only if the conceptus is aborted well preserved, for otherwise one would have to assume that psychic causes can produce sufficiently severe uterine contractions to cause the death of the conceptus, and that later, after the conceptus had become macerated, recurring or similar psychic disturbances finally effected the expulsion of the macerated specimen.

Since infectious diseases, no doubt, very often are the immediate rather than the ultimate cause of abortion, as Harris (1919) found in the case of influenza, it undoubtedly may be assumed that many of the abortions caused by such and similar complications of pregnancy were inevitable. They remind one of the defective fruit which persists insecurely upon the tree until a sudden gust of wind showers it to the ground. The findings of Harris regarding the effects of influenza and pneumonia upon gestation, seem to be confirmed also by the small number of cases of abortion in this series in which the abortion was attributed to an infectious disease. But in considering the alleged causes of abortion, one must bear in mind that when a woman knows of a plausible, extenuating reason for the termination of the gestation, she has every incentive to state it. That this is the case is indicated by the various strange, and, to the initiated, highly improb-

able or even impossible reasons often assigned for the interruption of a pregnancy.

Associated constitutional or venereal diseases were recorded in only 76 out of 697 selected histories. In 463 of these 697 cases, the cause of abortion was not given. In 52 out of the 72 cases in which associated diseases were present, other causes for the termination of pregnancy also were recorded. Hence the suggestion that the associated diseases probably were merely the immediate or incidental causes in these cases, seems decidedly probable.

What strikes one's attention in the perusal of some of the histories, is the long period during which many of these young conceptuses really were in process of abortion as indicated not only by the anatomic as contrasted with the menstrual age, but also by the repeated hemorrhages. Since in most of these cases the abortion probably was inevitable from the beginning, it would seem that the conclusion of Giacomini, reached also by Mall, that one should not temporize with such cases but promptly relieve the patient of an abnormal, dead or dying conceptus, would seem to be justified. That some general practitioners apparently are beginning to realize this situation is illustrated by the comment of Dr. Bacon, who, in connection with a recent specimen donated to the Collection, wrote: ''This makes the second or third case in which I have apparently delayed an abortion, and when the gestation finally was ended, was rewarded with an abnormal child for my pains. I wonder if it really pays humanity?'' However, the practitioner no doubt meets with great and often insuperable difficulties in determining the exact status of affairs, and in the present state of our knowledge, he must temporize so as not to be led into unjustifiable procedures. There is no doubt, however, that conservative symptomatic treatment, no matter how unavoidable in consequence of our inability to determine the condition of the conceptus, often is directly opposed to the best interests of the patient.

No case confirmatory of that reported by Jackson (1838) came to my attention among those in the Carnegie Collection. It seems strange that one of a pair of human twins can be aborted weeks or even months before term and that the other can continue in uninterrupted development to the end of normal gestation. Moreover, since the authenticity of Jackson's case rests solely upon the statement of ''a very intelligent lady'' who was ''too intelligent to be deceived and too honest to deceive'', one scarcely can feel convinced by it alone. However, Jackson stated that Nancrede observed a similar case in which one fetus was aborted at 4½ months and the other went to term, and Fuertes (1879), reported such an instance as one of superfetation. In this case a woman of 27 years gave birth to a male on March 13th, and to a female on July 27th. The former, which lived only 15 days, was regarded as having been born in the seventh month of pregnancy, and the latter

at full term. Bonnar (1865) also reported a series of cases of this sort in connection with a critical review of the question of superfetation. It is true that the alleged denouement in dystocia and also in cases of interrupted labor seems to suggest that even vigorous contractions of the uterus are not inconsistent with retention of attachment by the placenta, but expulsion of one with retention of the other fetus some months afterward, would seem to fall into a somewhat different category.

In examining the present histories one is impressed by the frequent cases of socalled "habitual abortion." These sometimes begin with the married life of a young woman and continue more or less interruptedly throughout her childbearing period. This is illustrated by the cases in which a birth at term was followed by several abortions, and by another birth at term and again by several abortions. Regarding some of these cases it clearly is stated that the patients took steps to terminate the unwelcome pregnancies, and in others the histories concerned mothers who had given birth to six or more, even up to thirteen children, and then had suffered one or more successive abortions, without any history of previous abortions. This is illustrated by the following seven cases, for example, in which the women had borne 6, 8, 9, 10, 11, 12 and 12 children, respectively. The first woman had experienced four successive abortions, the following five one abortion each, and the last, three successive abortions. In some of these cases it is fairly evident that weariness with heavy burdens of childbearing probably was responsible for the termination of the pregnancy, while in others abortion may have resulted from exhaustion due to a large series of quickly succeeding gestations, and in still others to pathologic or other causes. Experience with the higher domestic animals also would seem ·to suggest that abortion not infrequently follows too closely repeated pregnancies, especially under the stress of advancing years.

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121 WAVERLY STREET.

SPONTANEOUS EVOLUTION FOLLOWING TRANSVERSE PRESENTATION OF THE FETUS

WITH REPORT OF A CASE

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TRANSVERSE presentation of the fetus is a formidable complication, especially if the patient has been allowed to advance in her labor to the point where the arm has prolapsed and the shoulder has become impacted into the pelvis. In practically all such cases it will be found that the fetus is dead and unless proper treatment is instituted promptly there is grave danger of rupture of the thinned-out lower uterine segment of the uterus.

Decapitation of the dead fetus is, quite naturally, the first procedure considered when one is confronted by such a situation and as a general thing some such operation must be undertaken at once. Occasionally, however, spontaneous evolution may occur, and is of interest, not because it offers an outlook for delivery in a neglected case, but because of its extreme rarity.

Spontaneous evolution is a mechanism of delivery by which the body of the transversely presenting fetus is bent upon itself, being forced gradually down into the pelvis. The head impinges above the ileopectineal line on one side, and the neck becomes excessively stretched, thus allowing the shoulder, arm and thorax to be packed

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*Posthumous publication. Dr. Marshall's death having occurred on January 24, 1921.

down into the birth canal. Prolapse of the arm gains room for the trunk and eventually the groin, the buttocks appear next at the vulva alongside the arm, whereupon evolution is complete and delivery may be effected with comparative ease.

Spontaneous evolution is not to be confused with spontaneous version. This latter is simply the spontaneous conversion of a transverse presentation into a longitudinal one by virtue of the fact that the fetus is more or less freely movable in the fluid contained within an

Fig. 1.—First step in Douglas' mechanism of spontaneous evolution: impaction of shoulder with prolapse of arm

intact amniotic sac. This may be brought about by the occurrence of labor pains or even by changes in posture, and is mentioned merely to emphasize the distinction between the comparatively common thing on the one hand and the rare condition on the other.

HISTORICAL REVIEW OF CASES AND MECHANISMS DESCRIBED

Considerable confusion seems to exist in the minds of those who have been interested in these conditions, because of the distinction between

the three conditions, (1) spontaneous version, (2) partus con duplicato corpore, in which the head and thorax pass through the birth canal simultaneously, the head having been sharply flexed upon and pressed into the thorax, and (3) spontaneous evolution as described above.

Hippocrates recognized transverse presentations, and according to his ideas the prolapse of an arm was an indication of fetal death. Payer[1] says that Hippocrates considered the possibility of spontaneous evolution.

Fig. 2.—Second step in Douglas' mechanism of spontaneous evolution: stretching of neck, advance of trunk through pelvis, birth of shoulder.

Denman[2] in 1772 reported three cases of what he designated spontaneous evolution, and later claimed to have seen a total of thirty such cases, the baby being born alive in one instance. Payer[1] interpreted Denman's report as specifying a mechanism in which the prolapsed arm receded, after which the breech descended. Denman's description of his observations is too vague and inaccurate to warrant its designation as an exact mechanism.

In 1819, Douglas[3] described two types of mechanism by which

a transversely presenting fetus might be born spontaneously. He referred to them as spontaneous evolution and spontaneous expulsion. What he means by the latter term is not quite clear, but his description of the mechanism of spontaneous evolution is classic, with the result that this mode of delivery has come to be called "spontaneous evolution by Douglas' mechanism."

Fig. 3.—Third step in Douglas' mechanism of spontaneous evolution: birth of thorax and buttocks.

Stephenson[4] has described two cases of spontaneous evolution occurring in the Obstetric Service of the Johns Hopkins Hospital, and he is of the belief that this mode of delivery can take place only by Douglas' mechanism. The single case which I have to describe also followed the steps outlined by Douglas.

Description of Douglas' Mechanism.—Williams[5] in his textbook gives a brief but comprehensive description of this mechanism, and I feel that it may properly be quoted verbatim.

"In Douglas' mechanism, the first stage consists in the molding of the fetus and impaction of the shoulder with prolapse of the arm. Then, under the influence of strong uterine contractions, the child rotates about its vertical axis, so that one side of the head comes to lie over the horizontal ramus of the pubis with the breech in the region of the opposite sacro-iliac joint, while the neck subtends the inner surface of the symphysis pubis. Coincident with excessive stretching of the neck, the prolapsed arm continues to descend until eventually the corresponding shoulder emerges under the pubic arch. The escape of the arm and shoulder affords room for the entrance of the rest of the body of the child into the pelvic cavity, and the lower side of the thorax, promptly followed by the breech, soon emerges from the vulva. Following the breech the anterior side of the thorax and the remaining arm are delivered, while the head is born spontaneously, or is extracted manually, according to the exigencies of the case. In such cases the prolapsed arm is immensely swollen and a caput succedaneum develops over the presenting shoulder."

INCIDENCE OF SPONTANEOUS EVOLUTION

Transverse presentation occurs approximately once in two hundred pregnancies at or near term (Schroeder[6]). The rarity of spontaneous evolution will be appreciated, therefore, when it is pointed out that it occurs once in several hundred transverse presentations. Payer[1] collected records of 34 cases in 468,557 births, whereas Stephenson reports it as having occurred at Johns Hopkins Hospital twice in 13,000 deliveries. It has been observed at the Western Pennsylvania Hospital just once in a total of about 3,500 deliveries at or near full term.

CASE REPORT.—The patient, Mrs. S. B., a negress, aged twenty-nine years, pregnant for the eighth time. Her estimated date of confinement was August 22, 1920, but she passed this date, falling into labor two days later. It is of interest, since this was a twin pregnancy, that there is a family history of multiple pregnancies. Her husband has a brother and a sister who are twins, and the patient has two maternal aunts living, who are twins. The patient's other pregnancies and labors had been normal in every respect.

According to the attending physician, the delivery of the first twin was spontaneous after about four hours of labor, taking place at 12:05 P.M. on August 24, 1920. The membranes of the second twin ruptured about 3 P.M. and the right arm prolapsed through the vulva as the amniotic fluid drained away. The patient was being cared for under the most unsanitary and unhygienic circumstances and apparently there was little or no attempt at asepsis during the course of her treatment at home.

At 6 P.M. of the same day, the ambulance was called to take the patient to the Western Pennsylvania Hospital. Examination of the patient showed that the baby's entire right arm and shoulder were prolapsed through the vagina and vulva. The dorsal part of the right chest was also presenting, being visible as far as the inferior angle of the scapula. The baby was lying in a left acromion anterior position of a transverse presentation, and there was marked caput formation with its characteristic discoloration over the presenting part.

The ride to the Hospital was rather rough and the patient complained considerably during the trip of pains from which she was suffering. When placed upon the table in the Admission Room a distinct change was apparent from the findings as noted at the patient's house. The right arm and shoulder were prolapsed as described above, but in addition to this the right side of the baby's trunk down to and including the right buttock was visible at the vulva. The body of the child was in a state of

marked lateral flexion so that some of the left side of its back could be seen. The right shoulder was tightly impinged under the symphysis pubis, and the shoulder and arm were a deep purple hue. No heart sounds could be heard through the baby's thorax.

Sterile gloves were drawn on, and the mere insertion of the fingers into the baby's right groin, with slight traction was sufficient to cause advance of the right buttock, followed immediately by the left buttock and then by both feet. The evolution

Fig. 4.—Fourth step in Douglas' mechanism of spontaneous evolution: evolution complete, birth proceeding as in breech presentation.

was spontaneous except for this slight interference or assistance. Delivery of the head was easily effected by Mauriceau's maneuver, and it was noted at the time that the neck had been stretched to a considerable length. The infant was stillborn and weighed 2640 grams.

The mother's pelvic measurements were taken, and were those of a generally contracted pelvis of the rhachitic type. They were as follows: *Inlet;* interspinous 20.5

cm., intercristate 23 cm., bitrochanteric 28.5 cm., external conjugate 17.5 cm., diagonal conjugate 11- cm., true conjugate 8.5 cm., *Outlet;* anteroposterior 9.5 cm., transverse 10 cm., anterior sagittal 6 cm., posterior sagittal 9 cm.

A papier mâché model pelvis, the measurements of which corresponded fairly closely to those of the patient was taken and the dead infant passed through it in duplication of the steps which had been observed. Several interesting photographs of the different steps in the mechanism were taken by Dr. J. F. McCullough.

It is of interest that Herrgott[7] has recently reported a case of spontaneous evolution with a history closely resembling that of this case. It occurred in the second baby of a twin pregnancy, and the delivery was completed immediately after a long, rough ride to the hospital.

To summarize this subject as presented here, it may be said that spontaneous evolution is so rare that it cannot be relied upon to solve the problem of a fetus presenting transversely and impacted. The only accurately described mechanism of this delivery is that of Douglas, which was the type observed in this case. The occurrence of evolution seems to be largely dependent upon several factors, such as maceration of the fetus, unless it be small by virtue of being one of twins, or premature. It is also essential that the neck stretch sufficiently so that the head can be above the ileopectineal line and the laterally flexed body within the birth canal.

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THE SIGNIFICANCE OF THE PELVIC OUTLET IN PERINEAL LACERATIONS, CYSTOCELE, AND PROLAPSE*

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ALTHOUGH it is universally recognized that the conformation of the pelvis influences the course of labor, there is little in obstetric literature regarding the relations of the pelvic dimensions to the production of perineal lacerations, cystocele and prolapse. Indeed, when the nonpregnant woman enters the hospital for the treatment of injuries involving the pelvic floor, mensuration of the pelvis is commonly neglected.

In the Woman's Clinic at Yale we have practiced external and internal pelvimetry of the inlet and outlet of the pelvis not only in our obstetrical but in all gynecologic cases. The routine examination of cases presenting themselves gave me the impression that while a varying degree of perineal relaxation is generally encountered with injuries of the pelvic diaphragm, the most notable degrees of cystocele and prolapse are associated with a bony outlet which presents no abnormalities. This observation stimulated me to a study of the pelvic outlet in a group of women presenting these lesions in order to disprove or verify my original impression and to determine whether the type of pubic arch plays a part in the type of injury which occurs. And, also, I have considered the question, in childbearing women, of a secondary perineal repair as viewed from the angle of outlet pelvimetry.

It is generally agreed at the present time that the uterus and bladder are held in position by the fascia and ligaments of the anterior segment of the pelvis supplemented by the muscles of the pelvic floor. There is not, however, a unanimity of opinion regarding the effect upon these organs of injuries to the different supporting structures. Prolapse and cystocele are frequently seen accompanying a third degree tear of the perineum and for this reason many have concluded that the laceration has a causal relation to them. But, obviously, it is illogical to conclude that deep lacerations of the perineum are always of noteworthy significance in connection with the abnormalities in question, since descent of the bladder and uterus can exist for many years unassociated with such an injury to the perineal body.

Indeed, the experience of various investigators accords entirely with this conclusion. Thus Gännsle in a clinical study of 138 women

with a complete perineal laceration found prolapse of the uterus in only 48.2 per cent. Moreover, Treub diagnosed a cystocele in but three of fifty-five cases in which a perineal laceration extended into the rectum; while in 146 cases of prolapse seen by the same author a complete tear of the perineum was present but once. Similarly, Schaback, upon analyzing a series of fifty cases of perineal laceration found a slight prolapse in but nine instances, and Nebesky reports that of 34 cases of complete perineal laceration only nine were complicated by descent of the uterus.

Such observations indicate that the anterior and posterior segments of the pelvic floor do not suffer equally during delivery; for although a third degree tear may occur, the structures supporting the bladder and uterus may escape injury. Conversely, descent of the bladder and uterus is seen associated with a perineum which is practically intact. It appears, therefore, that while a deep perineal laceration with separation of the levator ani muscles may allow an increase in the degree of cystocele or of prolapse, it is not an important factor in their production.

Under these circumstances, the underlying cause of cystocele and prolapse has been sought in an injury to the paravesical and paracervical tissues and various theories have been offered to account for the damage which occurs. Some authorities attribute the stretching and occasional atrophy of these structures to an undue prolongation of labor or to disproportion between the pelvis and fetal head; others regard the too early application of forceps, or the injudicious use of pituitrin as of etiologic importance. All these factors probably play a part in the causation of cystocele and descent of the uterus, but it seemed probable that a study of the pelvic outlet in relation to these lesions might throw additional light upon the mechanism of their production. It is the purpose of this paper to present the results of such a study.

With this point in mind I have reviewed the records of 100 patients who entered the Clinic for operative relief of perineal laceration, cystocele, or prolapse. Measured by the usual methods, the diameters of the pelvic inlet demonstrated in each case a superior strait of normal dimensions. In other words, no one of these pelves showed abnormalities due to a general contraction or to rickets. On the other hand, while the anteroposterior diameters of the pelvic outlet showed no remarkable deviation from normal, in certain cases the bituberal diameter was shortened. Usually, of course, it was well above 8 cm. and the pelvis was diagnosed as normal; in a smaller number it was 8 cm. or somewhat below and consequently the pelvis was classified as a typical funnel.

Upon this basis the 100 cases in the series in question fall into two groups: 79 in which the bituberal diameter of the outlet was normal

and 21 in which the diameter was shortened to 8 cm. or less. In 60 of the 79 cases with a normal outlet, the outstanding lesion was a cystocele or prolapse; while in 19 the perineal laceration was unassociated with these conditions. On the other hand, of the 21 women in whom a funnel pelvis was diagnosed, but 7 showed injuries to the anterior half of the supporting structures and these were extensive in only three. In the remaining fourteen a plastic operation was necessary only upon the perineum. In other words, of the 79 cases with a normal pubic arch 76 per cent were suffering from cystocele or prolapse, while 24 per cent showed lesions of the perineum only: Of the 29 cases with a funnel pelvis, on the other hand, only 33 per cent were associated with cystocele or prolapse as contrasted with 67 per cent in whom these lesions were lacking.

Even in the absence of data regarding the duration of the previous labors, the weight of the child and the consistency and size of the fetal head, the information derived from an analysis of the facts in our possession is instructive. In the first place, the significance of a forceps operation in the production of injuries to the structures of the anterior portion of the pelvic diaphragm is emphasized. Thus of the 19 women in whom the outlet was normal and unassociated with cystocele or prolapse, but 4, or 21 per cent, had been delivered by forceps. On the other hand, of the 60 patients with a similar outlet but presenting these lesions, 24, or 40 per cent, gave a history of one or more labors which were terminated instrumentally. The latter coincidence is explained, I believe, by the fact that in an effort to save the perineum the head is too greatly extended by the forceps. As indicated by Döderlein and Pankow, this procedure leads occasionally to a partial separation of the puborectalis from its attachment near the symphysis. Moreover, there must result an unusual stretching of the ligaments and fascia owing to the crushing of these structures between the occiput and symphysis. Again, although cystocele and prolapse were found most commonly in multiparous women, there were five primiparæ presenting these lesions of whom three had been delivered spontaneously. Finally, it is worthy of note that cystocele and prolapse were encountered most frequently in women with a normal bony outlet; or, in other words, associated with an inferior strait of such dimensions that there could be no disproportion between a normal-sized, well-flexed fetal head and the pubic arch.

It appears, therefore, that while prolonged labor, disproportion between the pelvis and the presenting part, a too rapid dilatation of the cervix or the injudicious use of pituitrin, may play a part in the production of cystocele and prolapse, the adaptation of the head to the pubic arch also is of significance. As the head escapes through a normal outlet, it fills out the space included within the pubic arch so that when the occiput engages beneath the symphysis, the suboccipito-

frontal diameter practically coincides with the anteroposterior diameter of the pelvic outlet or more accurately with the plane of least pelvic dimensions. Under these circumstances, as the presenting part descends, the anterior portion of the pelvic floor becomes forced against the inferior and posterior portion of the symphysis. In this event, damage to the paracervical and paravesical tissues occurs, predisposing to cystocele and prolapse. As I have shown, this takes place in spontaneous delivery and particularly when labor is terminated by forceps.

Perineal lacerations, of course, are most commonly attributed to abnormalities in the mechanism of labor. The most frequent of these is imperfect extension of the head so that the vulva is distended by the occipitofrontal instead of the suboccipitobregmatic or suboccipitofrontal circumference. In some cases, however, the presenting part may be directed too far backward, and since extension does not occur, the uterine contractions force the presenting part directly downward upon the perineal body instead of guiding it upward and forward toward the vulval opening.

In other instances perineal tears depend upon the method of expulsion of the head through the outlet of a funnel pelvis and this is perhaps the most important cause of complete perineal laceration. In such a pelvis, the bituberal diameter of the outlet is shortened and the pubic arch is lengthened and narrowed. The suboccipital region, therefore, can no longer engage directly beneath the symphysis, but as the contraction becomes more marked will impinge lower down upon the ischiopubic rami, so that in extreme cases the head can be extruded only posterior to a line joining the tubera ischii. Under these circumstances, owing to the extreme distention of the perineum, deep lacerations occur. At the same time, it appears that as a result of the backward displacement of the presenting part and the tearing of the perineum, the strain upon the structures of the anterior portion of the pelvic diaphragm is relieved, and thus they escape such serious injury as predisposes to cystocele and prolapse.

The importance of mensuration of the pelvic outlet in the prenatal study of obstetrical cases is generally recognized, but in conclusion I wish to point out that it is of practical significance also in the preoperative examination of patients presenting lesions of the pelvic floor. The inadvisability of extensive plastic procedures in the event of subsequent labors and the importance of the type of operation chosen for the repair of lacerations of the pelvic floor has been emphasized by Frank. Similarly, in women still within the childbearing period, the choice of operation for a perineal laceration should depend upon the character of the pelvic outlet. If the bituberal diameter is above 8 cm., the narrowing of the vagina with a high reconstruction of the perineum is less likely to prove disadvantageous in the event of future

delivery, for while a reproduction of the previous laceration is possible, it may, with proper care, be avoided. If the bituberal diameter is below 8 cm., however, a deep perineal tear will almost certainly recur in a subsequent labor. In pelves of this type the occiput cannot fit up under the pubic arch and in order to be delivered the head must be displaced backward toward the coccyx. Obviously, it follows that given a normal sized fetal head the extent of the newly produced laceration will be as great as that which formerly existed. Accordingly, if the bituberal diameter measures 8 cm. or less a conservative plastic procedure should be adopted. From the standpoint of operative treatment, then, outlet pelvimetry is of value for it gives information regarding the character of the inferior strait and thus indicates the type of perineal repair which is adapted to the individual woman still in the childbearing period.

To recapitulate:

1. In 100 women presenting perineal laceration, cystocele, or prolapse, mensuration of the pelvis demonstrated a bony outlet of normal dimensions in 79 and a typical funnel pelvis in 21.

2. Of the 79 cases with a normal outlet, 60, or 76 per cent showed a cystocele or prolapse as the outstanding lesion, while in 19, or 24 per cent, a perineal laceration was unassociated with these conditions.

3. Of the 21 women in whom a funnel pelvis was diagnosed, lesions of the structures in the anterior half of the pelvic diaphragm were present in but 7, or 33 per cent. In 14, or 67 per cent a plastic operation was necessary upon the perineum only.

4. The significance of the forceps operation in the production of injuries to the supporting structures in the anterior portion of the pelvic floor is emphasized. Of 19 women in whom the outlet was normal and unassociated with cystocele or prolapse, but, 4 or 21 per cent had been delivered by this procedure. On the other hand, of the 60 women with the same type of outlet, but presenting these lesions 24, or 40 per cent, gave a history of one or more labors terminated instrumentally.

5. Although cystocele and prolapse are usually encountered in multiparous women these lesions may follow a single spontaneous delivery.

6. In the series of cases in question, cystocele or prolapse was most frequently found in women possessing an inferior strait of such dimensions that there could be no disproportion between a normal-sized, well-flexed head and the pubic arch. This association is attributable to the fact that as the occiput passes closely beneath the symphysis damage to the supporting structures occurs, predisposing to descent of the bladder and uterus.

7. In certain cases deep perineal tears depend upon the mechanism of expulsion of the head through the outlet of a funnel pelvis. However, it appears that coincident with the backward displacement of the

presenting part and the tearing of the perineum, the structures of the anterior half of the pelvic diaphragm in many cases escape injury.

8. Mensuration of the pelvic outlet should be employed in the preoperative examination of women still in the childbearing period who present themselves for a secondary repair of the perineum and the type of plastic procedure should be adapted to the type of outlet in the particular case.

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POSTOPERATIVE TETANY DUE TO SODIUM BICARBONATE*

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CORVISART, in 1852, introduced the name tetany after studying cases occurring in epidemic form in Paris. Tetany is characterized by tonic, intermittent contraction or spasms of the muscles of the extremities—usually symmetrical in distribution, and most frequently affecting the muscles of the upper extremities—resulting in a characteristic position of the hands, the so-called obstetrical hands. The thumb is turned into the palm, and the proximal phalanges flexed, and the middle and terminal phalanges are extended. There may also be slight flexion at the wrist. The cramp-like contractions are often painful. Consciousness, as a rule, is retained.

Tetany, at the present time, is regarded as a symptom complex, occurring under many different conditions, and therefore is referred to under many qualifying names, usually indicative of the supposed etiology in the given case, such as tetany idiopathica, seen chiefly in young adults, tetany epidemica, or rheumatica, occurring in Europe, tetany gravida, tetany gastroenterica, tetany toxica (chemical and bacterial) tetany parathyroidea, etc.

Tetany, therefore, should not be regarded as a disease conception but as a "more or less localized manifestation of a convulsive nature—due to a large number of exciting causes—possibly with some single and unique underlying factor." (Modern Medicine, Vol. V.)

Tetany is not a common clinical manifestation, and is rarely seen in adults. The epidemic form has never been reported in the United States.

Some research workers have shown "an intimate relation between the various forms of tetany and an insufficiency of the parathyroid glands." (Kinnicutt).

MacCallum and Voegtlin have suggested a direct relationship between disturbances of the calcium content of the tissues of the body and tetany, and have shown the moderating effect of the calcium salts upon the hyperexcitability of the central nervous system and that calcium salts have a controlling influence upon the spasm of experimental tetany. "The identity of experimental tetany in animals with human tetany, and the recognition that all the various forms of tetany clinically described have a common basis in parathyroid insufficiency, followed from a long series of experimental and clinical observations." (Monographic Medicine, Vol. 4, Barker.)

These researches tend to show that "the secretions of the parathyroid bodies exert in an as yet imperfectly understood way a controlling influence upon calcium metabolism." (Kinnicutt.)

The results observed by MacCullum and Voegtlin have suggested the probable value of the calcium salts in the treatment of the various forms of human tetany.

The cases I wish to report to you are instances of postoperative tetany in adults. These cases have developed symptoms of tetany in its varied manifestations after celiotomy for operations on the pelvic viscera. There were seven cases.

Onset of the typical hand symptoms was observed as early as seven hours after operation in Case 5, and the symptoms terminated within forty-eight hours after operation in each case—either in response to treatment, or by the death of the patient. There were four deaths and three recoveries.

The patients received nitrous oxide and ether anesthesia administered by a specialist and the operations were done by four different surgeons.

The last three cases recovered after the administration of calcium lactate by mouth. In Case 5, the symptoms had been present twenty hours before the calcium lactate, with lime water, was given.

The records of these cases are briefly as follows:

CASE 1.—S. C., Aet. 30, Married, Weight 95 lbs., Complaint: Menorrhagia, Diagnosis: Retroversion of uterus, Operation: Dilatation and Curettage (diagnostic), Hysteropexy, Appendicectomy.

The operative procedure was simple and uncomplicated; and the patient was returned to bed in excellent condition. Ten hours later the temperature had risen to 104°, and the pulse to 120. The patient was somewhat stuporous, but answered questions intelligently—and seemed fairly comfortable. Two hours later she had a convulsion, and had become decidedly more stuporous. The convulsion was generalized and clonic in type, and was frequently repeated until her death five hours later. At the end of a convulsion the patient would become very cyanotic before resuming breathing.

Thirteen hours after operation the temperature was 107°, pulse 140, respiration 28. Patient was given 1200 c.c. salt solution intravenously after first convulsion, but died sixteen hours after operation, with a temperature of 109°. Blood culture negative. Lumbar puncture negative. Postmortem examination negative except for a small heart and aorta and an enlarged thymus. There was no general lymphatic enlargement. Brain negative.

CASE 2.—M. V., Aet. 32, married 8 years. Para. 0. Complaint: Pelvic pain. Diagnosis: Fibromyoma Uteri and Chronic Salpingitis. Operation: Myomectomy— (2) Hysteropexy (Kelly), (3) Double Salpingectomy, (4) Right Oophorectomy, (5) Excision Cervical Polyp, (6) Appendicectomy.

Patient left operating room at 10:50 A.M. in good condition. Up to 5 P.M. the pulse rate did not exceed 110. During the evening it gradually rose, and at midnight was 160. The temperature also rose and at midnight was 103.6°. There was marked mental restlessness, mild general convulsions, transient nystagmus and strabismus, typical involvement of hands and feet, as in tetany; at times the general spasm was so marked that the position of the body suggested strychnine poisoning. There was profuse diaphoresis. The patient became comatose, the temperature rose to 107.4°, pulse 160 plus, and she died at 4:45 P.M., about thirty hours after operation.

Sixteen hours after operation patient was given 1000 c.c. normal saline intravenously, and during the next fourteen hours she received three infusions of 500 c.c. each. No postmortem.

CASE 3.—M. M., Aet. 30, married 3 years, Para 0. Complaint: Pain in back and left ovarian region. Diagnosis: Retroversion and Chronic Salpingitis. Operation: Hysteropexy, Left Salpingectomy, Appendicectomy.

Patient returned from operation in good condition and remained so until the following morning when the pulse and temperature began to rise and the patient developed typical hand symptoms of tetany, and complained of a peculiar feeling about the muscles of the face. She had considerable diaphoresis, but was not restless mentally or physically.

These symptoms persisted with gradually rising temperature and pulse until her death, about forty hours after her operation. Postmortem refused.

CASE 4.—L. N., Aet. 27, married 5 years, Para 0. Complaint: Leucorrhea-pelvic pain—feels weak. Diagnosis: Chronic Pyosalpinx. Operation: Right Salpingo-oophorectomy, Appendicectomy, Plication of round ligaments.

The operative procedure required less than an hour, and the patient was returned to bed in good condition. Pulse and temperature, however, rapidly rose in the twenty-four hours following operation, and the patient died about forty-two hours after the operation with a temperature of 107.5° and a pulse of 160 plus.

The other symptoms were great mental anxiety and apprehension and frequently calling out in a loud voice of seeing fire and of crashing sounds, as of thunder, and of lightning flashes. Marked diaphoresis was present, and the typical hand contractions of tetany with complaint of numbness in legs and peculiar sensation of stiffness in jaw muscles.

CASE 5.—M. P., Aet. 29, married 5 years, Para 0. Complaint: Leucorrhea and sterility. Diagnosis: Retroversion and Chronic Salpingitis. Operation: Hysteropexy, Left Salpingoöophorectomy, Appendicectomy.

Duration of operation fifty minutes, patient returned to bed in good condition. About six and a half or seven hours later, she began to show the typical hand symptoms of tetany and to seem to be mentally anxious. The pulse and temperature slowly increased so that ten hours after operation they were 101.4° and 122. In the meantime, the cramplike contractions in the hands became more marked and more constant, and there was complaint of numbness, or pins and needles, in legs and

body and of an unpleasant stiffness of muscles of face. These symptoms of tetany persisted without any change for twenty hours, and then calcium lactate gr. 15 and lime water two ounces were administered by mouth every hour for eight doses. In less than four hours after starting this treatment the symptoms had practically disappeared and the patient made a complete recovery.

CASE 6.—C. J., Aet. 38, married 19 years, Para 3. Complaint: Lump in abdomen—shortness of breath. Operation: Supravaginal Hysterectomy, Bilateral Salpingo-oophorectomy, Appendicectomy.

Patient was returned from operating room in good condition but about ten hours later developed twitching of hands and feet, numbness in left side of face, extremely restless and anxious, complained of difficulty in breathing, profuse diaphoresis, temperature 103.4°, tachycardia 140, and the typical bilateral cramplike contractions of tetany in both hands. Calcium lactate was administered by mouth, and the symptoms promptly cleared up.

CASE 7. R. S.—Complaint: Pain in epigastrium. Symptoms began twenty-four hours after operation, were intermittent and not very annoying. Rigidity of hands and jaw, spasmodic contractions of hands, also of jaw, especially following nausea, no tachycardia or hyperpyrexia. Trousseau's phenomena present three days after subsidence of symptoms.

These cases occurred irregularly over a period of four months. The first four cases terminated fatally; and, despite thorough postmortems in two of these cases, with careful antemortem blood studies, no positive information as to the probable or exact cause of death was obtained. A most searching investigation was made of all possible sources of infection of a bacterial nature, or poisoning, but without avail. Quite naturally the feeling and the fear of those in charge of the cases was that they were the result of some virulent bacterial infection of unknown origin, and every effort was made to clear up this question.

It was not until the death of the fourth case had occurred, and a comparative study was made of the symptoms present in each, that a tentative conclusion was reached that we were probably dealing with tetany in an unusual form and that it was the result of a toxemia of unknown origin, possibly bacterial; but, in view of the negative findings of the postmortems, more probably chemical.

Later, when the fifth case occurred and the diagnosis of tetany was confirmed by the usual tests, Trousseau's and Chvostek's, the patient was given calcium lactate and she recovered.

In the sixth and seventh cases, as soon as the diagnosis was made, calcium lactate was administered and they recovered.

The symptoms in the fatal cases were tachycardia, profuse diaphoresis, hyperpyrexia, epigastric distress, bilateral, symmetrical spasms and contractions of muscles, especially of the upper extremity, and convulsions.

The prompt recovery of the fifth, sixth, and seventh cases, following

the administration of calcium lactate, satisfied us that we were dealing with a form of tetany toxica of chemical origin.

The source of trouble was apparently finally traced to the glucose and sodium bicarbonate enema administered as a routine to most of the major operation cases. This was supposed to contain 5 per cent glucose and 5 per cent sodium bicarbonate in eight ounces of water at a temperature of 100° to 110° F. It was given as soon as possible after the return of the patient from the operating room, and was repeated again in four hours.

The first enema also contained forty grains of sodium bromide. Through an error in calculation, 1200 grains of sodium bicarbonate was given with each enema instead of 180 grains; and enough of this was absorbed in a short time to upset the normal relations between the sodium, potassium, calcium, and other ions in the neuromuscular tissues, resulting in the symptoms described.

The symptoms in these fatal cases were in many respects identical with those induced experimentally in animals by Münzer, Greenwald, and Binger, after intravenous administration of neutral solutions of the sodium salts (chloride, sulphate, phosphate, and bicarbonate).

Tetany occurred in two cases in children, according to a verbal report from Dr. Rowland G. Freeman, associated with excessive use of sodium bicarbonate, one case of acidosis in which symptoms disappeared on stopping sodium bicarbonate and reappeared on again using it. Another case of pyelitis in which tetany occurred under use of sodium bicarbonate.

Dr. E. B. Sanford states that in 1917, during the administrations intravenously of 1000 c.c. of 5 per cent solution sodium bicarbonate to a very ill case of diabetes with symptoms of acidosis, the patient suddenly, near the end of the infusion, developed symptoms of tetany in both hands, became comatose, and died six or seven hours later. There were no convulsions.

Case No. 7 is said not to have received any sodium bicarbonate, but did receive the glucose and sodium bromide. This patient reports that her sister had similar symptoms, but in her feet, after an operation. This patient also showed Trousseau's phenomena on the day following the disappearance of active symptoms and again two days later. This was probably an instance of latent tetany or latent neuromuscular hyperexcitability brought out by shock of operation. This case had none of the constitutional symptoms of toxemia shown by the other cases and is included here only to emphasize the prompt response to the administration of calcium in this as well as in the 5th and 6th cases.

Binger, following intravenous injections of sodium phosphate solutions of various kinds in dogs, observed marked symptoms, such as fibrillary muscular twitching, tremor, tetany and convulsions. He

emphasized very strongly the fact that the calcium content of the serum was much diminished after the injection of sodium phosphate, and directed attention to the similarity of the symptoms in dogs after the injections of sodium phosphate solutions and after parathyroidectomy, recalling that MacCallum and Voegtlin reported a diminution in the blood calcium in the parathyroidectomized dogs.

Binger says the question of toxicity is a relative one; even sodium chloride if injected in sufficient quantities is toxic.

Greenwald believes that while there may be differences in the symptoms produced by the different salts of sodium, the chloride, sulphate, phosphate, and bicarbonate, they do not differ markedly in their toxic qualities. He believes that the effects of the injection of these solutions are due very largely if not entirely, to the volume of the solutions, the changes in reaction and osmotic pressure which it produces in the blood plasma and in the tissue fluids *and to the increased concentration, both absolutely and relatively, to the other cations, of the sodium ions.*

Münzer reported an extensive series of experiments with a large number of sodium salts, injected in approximately 10 per cent solution into rabbits.

The same general symptoms were obtained with all the salts. The most marked effects were observed in the neuromuscular apparatus. The sequence was increased reflex excitability, fibrillary twitching, tremor, tonic-clonic convulsions with opisthotonus, and death.

Greenwald states that in his experiments with dogs the administration of either sodium sulphate or phosphate, as well as of the chloride, is followed by an increased elimination of chlorides, and that the level of the calcium of the blood is not maintained but falls considerably.

The question of importance to be decided, it seems to me, is whether it was possible for these patients under the conditions described to absorb enough sodium bicarbonate to give rise to the symptoms observed. They had received preliminary catharsis, had received general anesthesia, ether and nitrous oxide gas, had no nourishment except a small quantity of fluid by mouth, and their excretory organs were more or less inhibited or slowed up by the subcutaneous administration of morphine to relieve postoperative pain.

If so, was the resultant condition one of alkalosis due to the administration of an excessive quantity of sodium bicarbonate as in a case of tetany reported by Tileston and also in one reported by Harrop, or was it a condition of sodium poisoning in which the symptoms resulted from a disturbance of the balance of normal relations between sodium, potassium, calcium and other ions?

My own impression based upon the prompt response to treatment with calcium salts is that these were cases of sodium poisoning and not of alkalosis.

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525 PARK AVENUE.

DRAINAGE OF PUS-FORMING LESIONS OF THE ABDOMINAL CAVITY*

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A STUDY of surgical literature forcibly impresses one by the popularity of certain subjects during definite eras.

We are at the present era living surgically in the region of the upper abdomen; the septic lesions are unpopular on account of an expected heritage of high mortality. The supposedly good excuse we have for bad results and indefinite outcomes in peritonitic surgery is largely illegitimate. This paper is prompted by the large number of patients I see in consultation who have had prolonged drainage, or upon whom I have operated for complications due to inferior drainage and unfinished surgery.

The students of today are being taught that gauze is not a drain and teachers have gone so far in their condemnation of gauze as a drain, that the student is taught to call gauze-drainage "a pus poultice." Answering such teaching in its kind, I prefer to have the pus in the poultice rather than in the abdominal cavity.

In due proportion as operators discarded gauze as a drain, they began to classify more cases as inoperable; and as they grew timid in the use of gauze as drainage of serious abdominal conditions, they became more timid in their toilets of septic abdominal lesions and even more timid in the scope of their surgery which has been followed by multiple operations for the expected complications.

The eternal rule of compensation is ever present, even so, in abdominal surgery a thing half done must be done again.

I have seen during the past ten years the surgical profession travel in a vicious circle in dealing with peritonitic and pus-forming lesions. They have taken from us that most important first hour surgery by substituting a classification of the peritonitic lesions into operative and

nonoperative hours. They have confused the general profession through their false premises by teaching that general tenderness and distention means general or diffused peritonitis; they have encouraged later surgery, when lateness has been the great and grave error; and they have done much of this teaching on account of their high mortality in peritonitic lesions which was due to a lack of knowledge of gauze drainage. I am not going into the treatment of the surgical pathology of the peritonitic patient which I have discussed and condemned in a previous publication, but it is my object to point out the virtue and function of gauze as drainage in peritonitic and pus lesions.

In the very first place, before operators can properly use gauze as a drain, they must remove the pathology and take care of the complications, namely, adhesions, complete or partial bowel obstruction, distal abscesses, etc. If they are going to follow the teachings of the so-called physiologic surgeon of this hour who places the peritonitic patient on the waiting list for subsidence of active symptoms, it will not be worth the time of the reader to go further into my discussion as he cannot use our system of drainage without doing thorough work and a finished toilet. I want to say to the profession that the surgery taught and practiced at this hour in the pus-forming and peritonitic lesions, is as far behind privileged surgery as practiced by the late Joseph Price, as it is possible for me to conceive. As operators grew timid in the scope of their surgery, they were necessarily forced to inferior and less radical methods of drainage. One cannot place the coffer-dam drainage until the pathology has been removed, adhesions broken, and proper toilet made, which is all against the advice of the surgery of this so-called physiologic age in abdominal surgery. I am forced to believe that the entire mental attitude of the teachers toward drainage of septic abdominal lesions, is established upon a false hypothesis. One cannot view drainage in the simple sense of a mechanical means of conveying infectious discharges from a local point to the outside world. In other words, one must think beyond rubber tubes, glass tubes, gauze, etc. If one's knowledge of this subject is consumed in the material used for drainage and not the real extent of the surgical pathology he is attempting to treat, then I say he has not learned the first steps of the subject. No one likes pus work, any results seem to be justified.

Complications and multiple operations are expected. The excuse that pus and peritonitis are present is given as a legitimate excuse for any termination. As operators began to classify the peritonitic patient into operative and nonoperative stages, they immediately inherited the later operative hour with more pus and peritonitis and at the same hour began to discard gauze as a means of drainage. The surgeon thus not only willed himself more pus and peritonitis, but discarded the greatest and only means of successfully treating these

very ill patients. I view this as the gravest error the abdominal surgeon has made and he could not have done so had he viewed drainage in its broadest sense. The profession must remember that the simple abdominal incision is drainage, each partial or complete bowel obstruction released is drainage, each and every adhesion broken is drainage, every gangrenous structure removed is drainage, each viscera released from its pathologic fixation releasing pus pockets is drainage, release and elevation of structures from their fixed positions where they are being macerated in collections of pus is extensive drainage, and lastly, the very foundation of drainage is removal of the distal infecting source. Nothing short of all this is drainage. Will the operator now ask himself whether he has properly drained his patient? If he has not gone this far, he is in no position to condemn gauze as a drain. The feebleness of attempts at drainage is the most reprehensible work I see in urgent abdominal surgery. The surgeon who views drainage in a less extensive plan must not condemn gauze drainage, as it is absolutely necessary to go just this far in one's toilet before he can properly drain. Can you drain a perforated appendix which has all the above heritage of complications, if that appendix is not removed? You cannot.

The most unsurgical picture I know of is a drain of any kind placed on top of a mountain of pathology. Please get away from that idea of simply draining the dependent points in a peritonitic abdomen, and remember that infection other than that of metastasis travels by continuity or contiguity of structures, and one finds the filth not necessarily all at the primary infecting source but in continuity with that source. This is sufficiently accurate to be an excellent working factor. For instance, in a supposed diffused peritonitis it would be poor surgery to pass flying buttresses of gauze to both loins and the pelvis because they happen to be dependent points of the abdominal cavity. It would be equally unwise to drain the pelvis if the perforated appendix was high up between right parietes and ascending colon, and it would be wrong to drain the clean pelvis when you had removed a retrocecal gangrenous appendix. Remember please, that any drain placed in the abdominal cavity where drainage is not indicated, is a fertile source of bowel obstruction; truth of indication is strongly bespoken here.

In drainage you cannot anticipate where pus might go or be found and drain with the idea of prophylaxis. It must be apparent to the reader that if the operator fails to seek and to remove the distal infecting source, he cannot use gauze drain. There is no subject so difficult to teach as when and how to properly drain.

Thousands of patients die yearly who could be saved by extensive coffer-dam system of drainage, and I further say that thousands of patients come yearly to surgical clinics who cannot be saved by any

other system of drainage. As operators discarded gauze drainage, the percentage of operability of the peritonitic patient greatly decreased. The cause of this was easily apparent, the drainage tube used in such extensive infections is worth little; indeed, it is not much better than the simple incision. The death rate being high from lack of toilet and inferior systems of drainage, had much to do with the classification of the peritonitic patient into operable and nonoperable stages of the physiologic surgeon who has taken from us thirty-five years' progress in these cases. The "hands off" method of treating these peritonitic patients came from a lack of knowledge of a thorough toilet and a thorough system of gauze drainage, and such teachings still fly under false colors, as it was supposed by the physiologic surgeon that he had done too much and therefore adopted the watchful waiting of today, when in reality he had only made feeble attempts at radical surgery and more feeble attempts at drainage. I have been an unnoticed visitor in clinics and have heard the operator say that he was inserting the famous coffer-dam of gauze of the late Joseph Price. With all respect to such operators, I could not have recognized it as such even though it had been so labelled. I have referred to this previously. So the greatest of all blessings for the peritonitic patient was discarded on account of lack of knowledge of the most important factor in treatment.

I resent this condemnation of gauze as drainage for the peritonitic patient with every cell of surgical sense I may possess. Those who condemn the coffer-dam method of draining the peritonitic patient or those with a great mountain of pathology beginning with the culdesac of Douglas and ending above the umbilicus, are contemptuous of the real facts in the surgical problem. I do not question their motive but their surgical wisdom is without foundation. It is my opinion, indeed to me it is a fact, that the surgery done today in the extensive abdominal infections, is no where nearly so well done as that of twelve to fifteen years ago; and further, the future will bring more timid and helpless surgeons unless the teaching in the peritonitic patient is much revolutionized.

What led up to a discarding of gauze as a drain? First, the rubber gloves gave us the imperfect operations with the big incision through which the entire arm is inserted in exploration for diagnostic failures. The rubber glove prevented removal of the pathology on account of inability to seek and keep in lines of cleavage which is so necessary in order to enucleate pathologic masses and remove gangrenous structures. The pathologic structures not being removed, the coffer-dam drain could not be inserted, this necessitated the inferior tubal drainage which is often placed on the top of the mountain of pathology, a gruesome sight to a disciple of Joseph Price. I knew when operators donned the gloves and became instru-

ment operators and discarded gauze as a drain, the deathknell of the surgery in peritonitic and pus-forming lesions had been sounded and the physiologic surgeon was the product of this vicious circle. He and the phagocyte theory have remained supreme. But, the harder you throw the ball down the higher it will rebound.

Murphy, best known among surgical clinicians, could not remain long on the wrong side and shortly before his death he said, the mortality in appendicitis in the large institutions of our country was much too high and that the profession would have to renew its interests in the subject. The history of the surgical pathology of peritonitis must be rewritten. It is wrong from the standpoint of the true nature of the infection as to manner and source of absorption. It is wrong from the standpoint of diagnosis as to the extent of structure involved. It is much wrong from the standpoint of scope of surgery to meet the condition and it is all wrong in system and method of drainage which particularly concerns us in this paper. I repeat that you cannot view drainage from the simple aspect of conveyance of pathologic filth from a particular source to the outside world.

The mechanics of drainage are all most important and this is where the present teaching has been wrecked.

What is our idea of the function of the properly inserted cofferdam of gauze in the peritonitic patient? What does it do other than to simply drain, which is the one and only function of any kind of tubal drainage. Suppose we are draining a filthy area from a gangrenous and perforated appendix, or an extensive tubal and ovarian infection complicated by a peritonitis: first, we remove the appendix or the tubes and ovaries as the condition may be. If you are not going to do this you need not further read this article, as I said in the beginning of my discussion that the very foundation of drainage is removal of the distal infecting source; so if you have not done your surgery thoroughly, please do not condemn gauze as a drain, because it has not the handicraft to do your surgery for you.

Those filthy dependent areas from which you have removed the pathology are the areas or points at which you will find the postoperative bowel obstruction or secondary abscesses, if they are not properly drained. The viscera must be held from prolapsing into these filthy areas while the coffer-dam, which is a perfect piece of civil engineering, is inserted. This coffer-dam is a solid wall of gauze filling the pelvis and if the appendix is at fault, this wall of gauze is continued around from the pelvis up under the head of the cecum or to whatever position the appendix has been found.

Remember please, in all cases the coffer-dam is a continuous thing, a solid wall, not two or three columns of gauze going to different dependent areas. It must be apparent that the one half paralyzed, thick, heavy, edematous bowel cannot prolapse into the dependent and

infected areas from which the pathology has been removed on account of this wall of gauze. Again, that portion of the bowel which has been fixed and infected has been elevated, which greatly improves its circulation and repair and of course, drainage. The filthy areas themselves which often become a fatal source of retroperitoneal infection, are the very best drained by the coffer-dam, which at the same time prevents the formation of blood clots in the midst of infection, a very fertile field for bacterial invasion. These filthy, ragged areas, holes or caves, which remain after the pathology has been removed, must be distended with gauze in order that the multiple small abscesses will not form in the wrinkled or collapsing walls which have a tendency to form fissures, crevices or small pockets of pus continuing the infection. Tubal drainage cannot do this. I am of the opinion that were it not for this principle of ballooning the wound with gauze which was used in the Dakin-Carroll method of treatment, the tubes and solution used would not have been nearly so efficacious. It should be apparent that with this system of gauze drainage, the distal or secondary abscesses so often the cause of postoperative bowel obstruction cannot follow.

The indications which I give in the above discussion for gauze as a drain are not met in any particular by any kind of tubal drainage and have had much to do with the failures in teaching this subject. I cannot go into drainage of the particular lesions, but will say in general, that these coffer-dam drains are not touched for at least one week; they are then removed and no secondary or subsequent drains are inserted. These incisions are strapped as tightly as possible and you will be astonished to know that in a certain percentage of these serious infections, the incisions will heal as of primary intention, which so strongly bespeaks the thoroughness of drainage.

If a fecal fistula or pus continues to drain, we never go below the surface of the skin in our toilets of the incisions. No flushing of the incision, even though they are full of feces or pus.

When you are in the abdomen do thorough housecleaning, drain thoroughly, but when you get out stay out; incisions will heal in one third the time by scientifically neglecting them. Trauma of incisions means secondary infection and prolonged drainage. The squeezing of a boil or carbuncle or irrigating and sponging an abdominal incision, are indiscretions of the ignorant. There is a most marked relation between the necessity of drainage and the rewards of the same.

Complete or partial drainage when not indicated, always gives bad results. The very thorough coffer-dam system of drainage when indicated is always followed by fewer adhesions than where inadequate tubal drainage has been used. The most disastrous adhesions come from lack of thorough drainage and incomplete removal of pathology, just what might be expected. I have a good number of times seen the abdominal incision burst open from pus accumulation following re-

moval of tubal and ovarian abscesses where tubal drainage had been used; but have never seen such follow the more thorough coffer-dam drain, a very clear distinction between fertility of kinds of drainage. The most thorough abdominal surgery in peritonitic and pus lesions cannot be done without a thorough working knowledge of gauze drainage.

To speak of gauze drainage as a mere "pus poultice" and condemn it as a drain in the critically ill peritonitic patient, is as void of surgical wisdom as fashion is void of philosophy.

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A BRIEF FOR THE USE OF IODINE IN THE PREPARATION OF WOMEN FOR DELIVERY*

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ALL obstetricians are in agreement that it is essential to obtain, in so far as possible, an aseptic field for delivery, whether the patient be in a hospital or in her home. There is no question about the wisdom of minute and painstaking care in the effort to prepare such a surgically clean field; there is a question as to the best method of preparation, and there are a number of methods employed.

The object of this paper is, not to inquire into the various forms of technic, as concerns the attending physician, the nurse, the room in which the woman will be confined, or the various and sundry draperies used with which to surround the patient, but to deal with the manner of preparing the patient herself, holding a brief for the use of iodine as a safe, simple, and efficient antiseptic for this purpose.

Anything that simplifies the means for obtaining a desired and desirable end, provided that end be reached with as great efficiency, is an advance in the right direction, and if such, deserves adoption. Any one who has thoughtfully observed the preparation of a patient for delivery by the most universally used method of scrubbing with soap and water followed by the pouring of various solutions from pitchers over the abdomen and thighs, must admit that the employment of iodine is simpler. Observe critically the process of scrubbing. The woman lies on her back, usually with thighs drawn up, her abdomen and thighs towering above the birth area. The nurse, or interne first thoroughly scrubs the thighs, abdomen, pubes, vulva and ischiorectal regions. Sometimes an effort is made to protect the vulval area by holding a pad over the vulva with one hand while scrubbing with the other, this precaution, however, is not always taken and is fallacious at best. As the nurse scrubs and works up suds, these suds contain the mixed

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and accumulated filth that lies upon the skin of all the above mentioned surfaces. Holding a piece of gauze as a wash cloth, the rotary motion of her hand when it passes over the vulva, is bound to force some of these suds in between the labia. Where an effort is made to protect the vulva, even then these suds find their way under the protecting pad as can be plainly seen when the pad is removed, just prior to the pouring of the solutions over the patient. Having finished with the scrubbing, a pitcher of sterile water is next poured from above, and the suds, containing macerated epithelial cells, hair, rectal mucus, particles of feces, and bacteria innumerable are carried with a gush, down the hill from the thighs and down the hill from the abdomen into and through the natural drain formed by the gutter-shaped space between the labia majora. No multiparous outlet is so tight as to exclude this sudden freshet, and few nulliparous ones! With the woman lying on her back, the vagina slopes downward and backward, again favoring the reception and final deposit in the culde-sac, around the opening os (possibly into the lower uterine segment itself), of material scrubbed from the lower abdomen, thighs, vulva and anus. Following this, a pitcher full of some mild antiseptic is poured over the parts, and the patient then draped.

There is a significant difference between the preparation of a patient for delivery in the above manner, and that of a patient for some vaginal or cervical surgery, in that, in the latter, *after* the scrubbing and pouring, the vagina itself is scrubbed and douched, and sometimes painted with iodine. I believe it is an established fact that vaginal douches before labor are not indicated, except in the presence of known infection, and if used as a routine would no doubt be productive of more harm than good; therefore, to make use of them after the external cleansing, would not only add a more involved technic of preparation, but also would be a step backward.

The above described procedures require some little time, and the providing of several solutions, as well as causing a good deal of inconvenience to the patient, more work for the nurses, and as usually carried out, does not seem to me, *safe*. I have seen women so prepared in various clinics and think I have given a fair and accurate description.

Let us in comparison examine the method of iodine preparation. The patient is given an enema as soon as she enters the hospital, or if at home as soon after she falls into labor as possible. The anal area is then carefully cleansed, a clean vulval pad applied and the patient is not disturbed with any more ablutions. When well on into the second stage, about the time when she is ready to be put to bed for delivery, the pubes and labia are shaved, using benzine as a softening agent. When the head is markedly distending the vulval ring, probably half a dozen pains before emerging, the obstetrician himself, carefully

paints the vulva, the iodine extending well over the mucus membrane. Particular attention is given to the crevices around the clitoris. Next the skin over the pubes and lower abdomen, the inner sides of the thighs and last, the perineal space, the buttocks and the anus. He then so disposes the sheets and towels that the only surfaces left exposed are those that have been thoroughly painted with iodine. This takes about two minutes, and the patient is, as a rule, sufficiently under an anesthetic at that time to be unconscious of any discomfort. The two occasional disadvantages of this preparation are: sometimes the patient is not anesthetized, or only slightly so, and she will complain of burning. This soon passes or becomes so slight that no more complaint is heard. The other disadvantage is, if one is not careful to use a solution of the tincture weaker than the ordinary pharmacopeial strength (7 per cent), a mild iodine burn will sometimes result: none of those that I have ever seen have caused much discomfort. It is not well to use a solution stronger than one half the regular strength, this is easily obtained by mixing equal parts of alcohol and the U.S.P. tincture. We must admit that this latter procedure is the simpler, and that it is safe. Now as to its efficiency.

Recently I have been taking cultures when the patient had been prepared by iodine as outlined above. The swabs were rubbed over both labia, across the pubes, in the crevices around the clitoris and across the perineum before delivery, and another swab over the same surfaces, after delivery of the placenta and any repair work that may have been needed. These were implanted on slant agar tubes and incubated for 48 hours. Thus far there have been 29 cases, the tubes showing no growth in any except one and that was a mould, the pathologist reporting that it was probably air implanted. I have not made any control cultures from cases prepared by the scrubbing process, these were cases from private practice and are too few from which to draw positive conclusions, but they show an excellent percentage of surgically clean fields, and the method seems worthy of further use.

If we are careful to see that other points in technic, such as the wearing of sterile gowns, caps and mouth protectors, using as much care as possible to avoid rectal contamination, if we further familiarize ourselves with diagnosis by abdominal palpation and rectal examinations, we will have made long strides forward in the safe delivery of the pregnant woman, and the next ten years will show a more hopeful lowering of puerperal morbidity and mortality than the last ten. With the problem of a clean delivery settled, there still remain the problems of those cases having remote foci of infection somewhere within the body, those receiving the infection through the vagina during the last few days of pregnancy, and those infected during the puerperium.

530 SHIRLEY AVENUE.

Case Reports

THE BEHAVIOR OF THE UTERUS IN ECLAMPSIA: A CASE REPORT*

By M. Pierce Rucker, M.D., Richmond, Va.

FROM Hippocrates to our own time much has been said and written about the rôle the uterus and its contents play in the causation of eclampsia, but there is not a word in the literature on the behavior of the uterus during a convulsion. From clinical observation we know that when convulsions begin antepartum, labor usually follows, and when they occur in labor the progress is rapid. This, however, is not always the case, as sometimes antepartum convulsions cease and the patient goes on to an uneventful delivery at a subsequent date.

Recently I attended a case that throws some light on this subject:

The patient was a white woman, age forty-two. She had borne one child and there had been no miscarriages. There was nothing important in her history except that she suffered from neuritis in her left shoulder and index finger, and was taking treatment from her physician for the neuritis, when she came to me. She said that she wanted to keep up this treatment, to which I readily consented. Her husband had always been well and gave no history of any skin eruption or rheumatism.

The patient consulted me two months before her expected date of confinement. Her pregnancy except for the neuritis had been perfectly normal. There had been very little nausea, no headache, nose-bleed, sores in her mouth, sore throat, skin eruption, falling out of hair or change in the amount of her perspiration. She was a little short of breath, but had no cough, night sweats, pain or palpitation of heart. Her appetite was good and at the time she came to me there was no nausea, belching of gas or vomiting. Her bowels had been kept regular with an occasional purgative. Her feet had been swelling moderately, and she had been in the habit of rising three or four times at night, but voided without pain.

On examination, head and chest negative. She had an abdominal tumor that corresponded in size and shape to a 32 weeks' pregnant uterus. The fundus reached 30 cm. above the symphysis. The pelvic measurements were as follows: interspinous 25; intercristate 29.5; intertrochanteric 34; external conjugate 21; right oblique 23.5; left oblique 23.5; circumference 92; height from symphysis to umbilicus 22.5; to fundus 30; to ensiform 39; pubic arch wide; tuber ischii 9.25; anterior sagittal 9; posterior sagittal 7; ant. post. 11; depth of symphysis 6; conj. diag. not felt; estimated true conjugate 11.

The perineum showed a slight tear. There was some edema of the labia. The vagina was large. Secretion mucus. The cervix was soft, external and internal os open. The hemoglobin was 80 per cent. Systolic blood pressure, 150, diastolic 90, blood Wassermann four-plus.

On August 2nd, two weeks after her first visit, her blood pressure was 120/80,

the urine was free from albumin and sugar. On August 17 her weight had increased 6 pounds and her legs were swollen up to her knees. She had no headache. Blood pressure was 180/90. Urine was free from albumin and sugar. She was put upon a bread and water diet.

A week later, August 24, in spite of her rigid diet she had gained 8¾ pounds more. Her blood pressure was 205/110 and she was having pains in the back of her head and was seeing specks before her eyes. Her bowels were regular and she was voiding freely. The urine showed a trace of albumin. Specific gravity was 1.006. No casts were found. Fetal heart was 130, Ahlfeld measurement was 26:5 cm., MacDonald 33 cm.

Induction of labor was advised, to which the patient readily consented. She came into the hospital the same afternoon and on admission her systolic blood
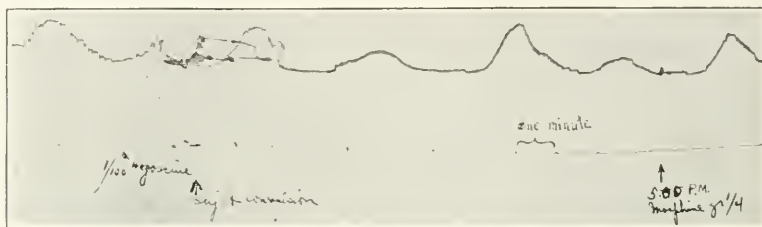
Fig. 1.—Tracing of intrauterine pressure during the first convulsion. The artifact was due to knocking accidentally against the recording drum.

Fig. 2.—Tracing during the general convulsion, showing stage of preliminary clonic convulsion, tonic convulsion, clonic convulsion, apnea, and labored respiration. The greatest intrauterine pressure was 162 mm. of Hg.

pressure was 210. A No. 6 Voorhees bag was inserted and the stem of the bag connected to an ordinary mercury manometer such as is commonly used in physiologic laboratories, so as to get a tracing of the patient's uterine contractions. The patient was given ¼ grain of morphine fifteen minutes before introducing the bag. At 4:55 P.M., one hour and twenty-five minutes after placing the bag, she was given 1/100 gr. of hyoscine. In a few minutes she had a slight convulsion confined to the muscles of the eyes. Both eyes were directed to the left and upwards in clonic twitchings, this was followed by some cyanosis. She was immediately given ¼ gr. of morphine. Following this the patient had a severe convulsion that started with the eye muscles and extended over the whole body. It quickly passed into a tonic spasm and then again into a clonic convulsion followed by a period of apnea

and deepening cyanosis which was relieved by deep labored respiration.   Fig. 2 shows these stages graphically.

The patient was given another quarter grain of morphine, her stomach was washed and two ounces of castor oil was given through a tube.   She had a slight convulsion, confined to the eye muscles, just before the stomach tube was used. The patient had six more slight convulsions before the birth of the baby at 7:37 P.M.   She was given the third ¼ gr. of morphine at 5:47 P.M. which made a total of ⅞ grs. of morphine during the afternoon.   The only other treatment she received
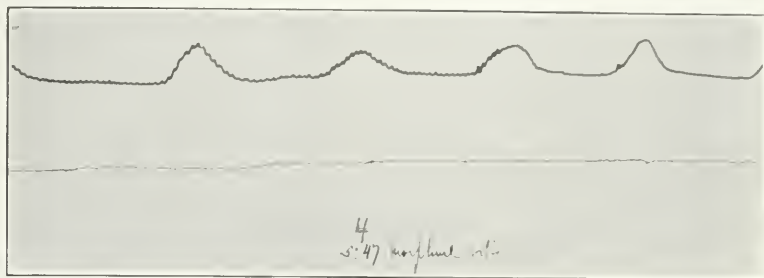
Fig. 3.—The patient had a convulsion confined to her eye muscles, at the point marked "4." Note that there was no effect on either the strength or the rhythm of uterine contractions.
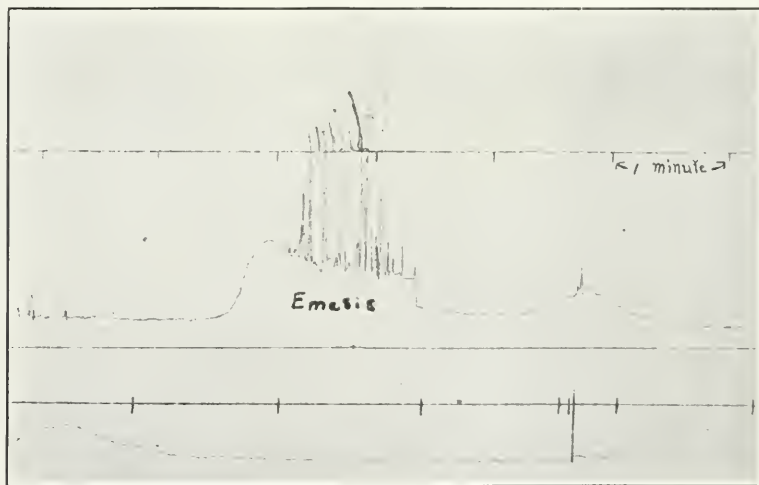
Fig. 4.—Tracing of another patient during a vomiting spell.   Note the similarity to the clonic stage in Fig. 2.   The greatest intrauterine pressure was 162 mm. of Hg.

was proctoclysis, a 5 per cent sodium bicarbonate solution being used.   During the labor the patient's pulse dropped from 160 shortly after her hard convulsions to 82. The respiration was kept down to 14 or 16 per minute with morphine.   The blood pressure at 6:20 P.M. was 160/110.   The fetal heart remained at 130 throughout the labor.

The bag came out at 7:02 P.M.   The waters were ruptured and a hand prolapsed. Without any anesthetic, forceps were slipped on the head, which was in midpelvis and an easy delivery effected.   The perineum was not lacerated.   The patient had a slight convulsion in the third stage of labor.

The child, a male, breathed after 40 minutes' artificial respiration with a lung motor.   He weighed six and a quarter pounds and measured 50 cm. in length.

The child lived 10 hours and in that time had several spells of rigidity (whether due to morphine or toxemia, I cannot say). Autopsy showed several large infratentorial blood clots.

On August 28, I made the following notes. The patient has been conscious and has felt well ever since the morning after her baby was born, but her blood pressure has not gone below 185. Yesterday, August 27, at 11 A.M. she was given a slice of toast and a cup of coffee and she has had one slice of toast since. Towards evening she began to complain of headache and pain in her breasts. At 2 A.M. patient complained to the nurse that she had spots before her eyes, and that her right hand jerked so she could hardly get hold of the bell. In about 10 minutes she said she felt real badly and wanted to see the doctor. She then went off into a severe clonic convulsion. A quarter grain of morphine was given at once and two more doses of the same size in rapid succession. When I saw her after the third hypodermic she was breathing 19 to the minute, rather stertorously, pulse was 88. She could be aroused and talked perfectly clearly, saying she felt well and did not mind being starved. A stomach tube was introduced, but the flow returned clear. Two ounces of Epsom salts were given per tube. It was then noticed that her pulse had gone up to 100 and in five minutes to 104. She was given the fourth ¼ gr. morphine hypodermic and a few minutes later (4:15 A.M.) had a hard convulsion. As the convulsive movements wore off, and before the apnea and marked cyanosis disappeared the patient repeatedly winked her right eye. The right arm was the last part of her body to stop jerking. During the apnea the pulse was scarcely palpable. At 4:30 A.M. her pulse was 94, and at 4:35 A.M. it was 88, at 5 A.M. pulse was 104. Patient was given ¼ gr. morphine. At 5:30 she had a convulsion and again at 6:00 and at 8 A.M. At 9:30 she was given one pint of sodium bicarbonate solution per rectum and this was repeated every two hours throughout the day. Patient had the eighth postpartum convulsion at 1:10 P.M. and her ninth at 1:45. Each of these lasted ten minutes, but did not leave the patient comatose. She has had all told 2½ grains of morphine within 24 hours and her blood pressure was still high (210/110). Patient was given four minims of veratrum viride which was repeated in five minim doses every hour until the blood pressure dropped to 175/108, and pulse to 84, which occurred at 7 P.M. (August 28.) She had seven bowel movements during the day, some involuntary. Urine (per catheter) was clear, 1.024, acid, marked trace of albumin, reduced Fehling's solution and fermented with yeast. One or two hyaline and granular casts were seen to a low power field together with amorphous and triple phosphates.

In the afternoon of August 29, the pulse rose to 100 and the blood pressure 200/105. I ordered five minims veratrum viride per mouth and agreed that patient might have water as she complained of being very thirsty. In five minutes she had a hard convulsion. Fifty minutes later blood pressure was 205/100, pulse 92. At 12:45 A.M. (August 30) she had another convulsion and her blood pressure went up to 220/100. Four hundred fifty c.c. of blood was taken from vein and her blood pressure dropped to 185/100, but slowly rose again to 205/100. At 4:40 A.M. when she had another convulsion, 250 c.c. of blood was withdrawn and in 40 minutes 500 c.c. more and the blood pressure fell to 175/85. At 6:00 A.M. the blood pressure was again 200/100. It was noticed that before each of the convulsions the patient regained consciousness and except for the high blood pressure seemed better in every way just before the onset of convulsions.

On August 30, the sixth day after delivery, Dr. Gayle was called in and found a suggestive Babinski on left side with fine tremors of the eyes. At 7:50 A.M. he punctured the spinal canal and removed about 40 c.c. of clear fluid. The spinal fluid was found to be under considerable pressure. The laboratory report on the spinal fluid was: cell count 3, lymphocytes 3, globulin ++++, Wassermann negative. Before the puncture the blood pressure was 195/95, pulse 100, and immediately afterwards the blood pressure was 170/80, pulse 78. This, however, was only temporary and

in a few hours blood pressure rose and the pulse became rapid. It was controlled exceedingly well with nitroglycerine, grs. 1/100 placed on the patient's tongue. This caused a drop in systolic pressure from 190 to 120 in 30 minutes. The dose was repeated whenever the systolic pressure went above 180 and the patient had no more convulsions. She made an uninterrupted recovery except for her vision. On Sept. 22nd Dr. Hill found her visual fields to be contracted, especially in each right, upper quadrant. There was a pronounced arteriosclerosis in the retina, and a slight exudate on the optic disc, the edges of which were hazy.

There are several interesting features in this case. In the first place, the convulsions reappeared on the fourth day postpartum, very shortly after she was given nourishment by mouth. This was very similar to a number of cases Tweedy cites in support of this theory that food in the stomach is the exciting cause of eclampsia. But my patient had complained of a pain in the breasts just before going into her first postpartum spasm, and engorgement of the breast may just as well have been the exciting cause in this instance.

Another interesting feature in this case is the effect of nitroglycerine upon the blood pressure, and seemingly, also upon the convulsions, when morphine, veratrum viride, bleeding and spinal puncture had afforded only temporary relief.

The most interesting feature, however, is the tracing of the uterine contractions. When the convulsions started there was no time to disconnect the apparatus, and when things had calmed down it was deemed best to leave the bag in, to favor dilatation, and the tracing was continued. I was very much surprised to find that the slight convulsions, those limited to the ocular muscles, had no effect upon the uterine contractions. The hard convulsion showed beautifully upon the chart, but upon comparing this tracing with the tracings of other patients, such as is shown for instance in Fig. 4, a case of emesis, it will be seen that the part played by the uterus is entirely passive. The great rise in the intrauterine pressure that is recorded by the manometer is due entirely to the action of the voluntary muscles and the diaphragm.

1600 Park Avenue.

REPORT OF TWO CASES OF FIMBRIAL CYSTS: ONE WITH TWISTED PEDICLE AND GANGRENE COMPLICATING PREGNANCY AND ONE SIMULATING AN ECTOPIC GESTATION

By Harry Cohen, M.D., New York City

THESE two cases present many unusual and interesting features. A review of the literature shows the first case to be of very infrequent occurrence. Although these cysts are histologically fimbrial, clinically they have for a long time been called parovarian. Eden and Lockyer[1] in describing these cysts state "the term fimbrial cysts is therefore here used as the title of those cysts which have previously been described as parovarian."

CASE 1.—FIMBRIAL CYST WITH TWISTED PEDICLE AND ACUTE APPENDICITIS IN A WOMAN FIVE MONTHS PREGNANT*

M. R., aged twenty-three, Russian, lifted a heavy mattress from the floor to the bed on the night of May 3, 1920, and immediately felt a sharp pain in the right lower quadrant of the abdomen. She was unable to leave the bed the next morning because of the pain, and vomited about ten times that day. Several physicians were called and morphine and application of an ice bag were ordered. There was, however, no relief from pain which now extended to the right kidney region. These symptoms continued to May 6 when, about 9 p.m. I was called to see her. In addition to the above, the following history was obtained: Married four years and has one child two and one-half years old. Her family and previous history are negative. Menstruation occurred every four weeks, lasted three days, and was never painful. Was now five months' pregnant. Never previously complained of pain in the abdomen or of any urinary symptoms. On physical examination there was marked tenderness and rigidity in the right midrectus region, also moderate tenderness in the right kidney region. Vaginal examination showed the uterus five months' pregnant, also marked tenderness in the right fornix. No mass was palpable owing to tenderness. Temperature was 100.4° F. and pulse 96.

She was immediately removed to the People's Hospital. A blood examination showed 14,400 white cells with 78 per cent polynuclear cells and a urine examination performed with the object of eliminating a pyelitis complicating pregnancy, complicated the diagnosis by showing heavy albumen, a large amount of blood and pus cells and no casts, kidney or bladder cells. However, feeling certain of the existence of an acute surgical complication, I operated. A right rectus incision was made and on opening the peritoneal cavity, a large amount of serosanguineous fluid escaped. On exploration a large, hemorrhagic, blackish, cystic mass was found. The size was about that of a tennis ball. It was found attached by a pedicle which was twisted to the broad ligament between the tube and ovary. The tube and ovary were normal in appearance. The mass was excised without disturbing the tube, ovary or fundus. The appendix was very long, markedly injected, considerably distended, and the seat

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*Presented at Clinical Meeting of the People's Hospital, May 12, 1920.

of an acute catarrhal inflammation. Appendectomy was performed and the wound closed up. The patient made an uneventful recovery. The urinary findings disappeared soon after the operation. The cause for this blood and pus in the urine was a pyelitis which cleared up as soon as the irritant was removed.

The *Pathological Report* by Dr. Alex. Fraser, was as follows: ''The cyst is in the broad ligament immediately under the tube. The surface is smooth, dull, and dark red in color. It is oval in shape and measures seven by five cm. One bunch of fimbriæ projects over the end of the cyst about three-quarter cm., a second bunch emerges from the cyst wall about one cm. further back, and still further back about one cm. there is an attached pedicled hydatid of Morgagni. These features serve to determine the origin of the cyst as from the ovarian fimbria of the tube. These cysts are usually called parovarian, but it has been shown by Keith that they are really fimbrial. The cavity of the cyst is filled with blood clot and the mural tissue is suffused with blood.

''*Histology.*—The tissue of the wall is necrotic and suffused with blood and polymorphonuclear leucocytes. Remnants of plain muscle fibers can be identified.

''*Diagnosis.*—Strangulated and gangrenous fimbrial cyst.

''*Appendix.*—The appendix is firm and swollen. It measures eight cm. by three-quarters cm.

''*Histology.*—Marked lymphoid hyperplasia encroaching on and causing atrophy of glands and musculature. The interstitial lymph vessels are stuffed with lymphocytes. The epithelium shows marked catarrhal distention and desquamation. In a few foci there is marked edema of mucosal stroma and hemorrhage in the lymph follicles.

''*Diagnosis.*—Subacute catarrhal appendicitis with acute exacerbation.''

This case presents three interesting features: First, the presence of this parovarian mass complicating pregnancy; second, the complications which may occur at any time to tumors of the ovary or parovarium, and third the effect of ovarian operations on coexisting pregnancy.

Cases of parovarian cysts are relatively infrequent. Wiener[2] in a thorough study of ovarian tumors found 10 cases of parovarian cysts out of 269 cases studied.

The second consideration in these tumors is the complications. In Wiener's 269 cases, torsion was the most frequent, occurring 33 times and going on to gangrene in three cases and ''In only one case the entire cyst wall was black and necrotic.'' In five of the cases there was free fluid in the abdomen but in none was there a severe peritonitis. Rupture, hemorrhage, infection and malignant degeneration were some of the other complications. Pregnancy was present in eleven cases. It is therefore evident that a parovarian cyst with torsion and gangrene and free fluid in the peritoneal cavity and complicating a pregnancy is an extremely rare condition and a fairly careful search of the literature fails to show a similar case. Parovarian cysts are usually sessile, but cases with pedicle and torsion are described by Kelly.[3]

Waters[4] reported a case of torsion of an enlarged hydatid of Morgagni and Oginz,[5] of a large subserous tubal cyst with torsion and gangrene simulating an ovarian cyst with a twisted pedicle.

The third and last consideration is the relationship to co-existing pregnancy both from a mechanical and physiologic viewpoint. Me-

chanically considered, many writers have frequently encountered ovarian cysts complicating labor at term. At this period ovarian cysts may become a menace to life of both mother and child. Humpstone[6] reports a case that required cesarean section. Aranow[7] reports two cases, in one of which the life of the child was sacrificed. Beach,[8] in an exhaustive review, concludes that all ovarian cysts complicating pregnancy should be removed as soon as the diagnosis is made. He claims that abortions will occur even under expectant treatment and cites figures to prove this contention.

Physiologically considered, most observers agree that after the fourth month of pregnancy, when the corpus luteum has fixed the structures within the uterus, oophorectomy may be performed without interrupting the pregnancy. Polak[9] reports three such cases: Holden[10] one.

There is a considerable amount of literature to prove that pregnancy may go on uninterrupted even when operations on the ovary take place before the fourth month. In Wiener's cases nine were operated before the sixth month with only one abortion, which occurred eleven days after a salpingo-oophorectomy. He reported the interesting observation that in one case the only corpus luteum was removed and in another the sole remaining ovary was excised and yet neither resulted in an abortion. He also quotes Lowenstein who removed an ovary for a dermoid. The patient subsequently became pregnant and in her third month the other ovary was removed for large cystic degeneration. Pregnancy went on uninterrupted and an eight pound child was delivered at term. The child was nursed for eighteen months. Menstruation never returned. Brothers[11] reported a case in which he removed a large intraligamentous cyst and performed a bilateral oophorectomy during early pregnancy without interrupting gestation. Grad[12] did an ovariotomy and myomectomy early in pregnancy and obtained a full term delivery. Lastly, Findley[13] describes a case of menstruation without ovaries but concludes, however, the probability that some ovarian tissue must have been present.

CASE 2.—FIMBRIAL CYST SIMULATING ECTOPIC GESTATION

This case represents one with typical pathology of a parovarian cyst, of about the size of a fist. Of interest in this case is the history and preoperative findings which simulated ectopic gestation.

Mrs. M. K., aged twenty-three, consulted me February 23, 1918. Her chief complaint was pain in the right lower quadrant of the abdomen. Her general history was negative. Was married and had two children. Her menstrual history was normal until the present illness. At this time she was two weeks overdue. Vaginal examination showed the fundus slightly enlarged and moderate tenderness in right fornix. I did not feel any mass in the right fornix at this time, although from subsequent findings one must have been present. On March 9 I was again called to see her. She now had very acute pain and tenderness in the right lower quadrant of the abdo-

men, had been bleeding vaginally the past few days, and on vaginal examination, a soft and very tender mass was felt in the region of the right tube. She was admitted to the Community Hospital with a diagnosis of unruptured ectopic gestation, presenting the four cardinal symptoms of pain, missed period, vaginal bleeding and the presence of a mass in the right fornix. On opening the abdomen I found a
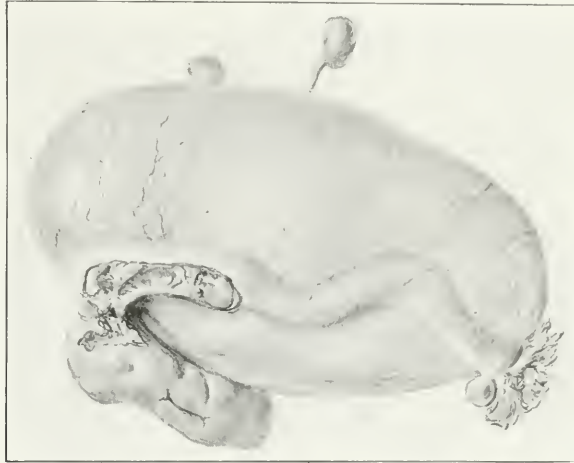
Fig. 1.—Showing parovarion cyst (Case 2) with tube imbedded in cyst wall.

typical fimbrial cyst of the right side with the ovary normal and the tube elongated, stretched and embedded in the upper surface of the cyst wall. The mass was removed intact and consisted of tube, ovary, and parovarian cyst. An uneventful recovery followed.

That ovarian tumors may cause irregularity in the menstrual flow is a well recognized fact. A case of parovarian cyst that caused irregular and profuse menstruation was reported by Stone.[14]

To conclude, fimbrial (parovarian) cysts, while considerably less frequent than ovarian cysts, are subject to the same complications and should be removed whenever discovered, pregnancy not being a contraindication.

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SIXTY-FOUR EAST THIRD STREET.

A HISTOLOGICAL STUDY OF FETUS AND IMPLANTATION SITE IN A CASE OF MISSED ABORTION

By J. P. Greenhill, M.D., Chicago, Ill.

From the Carnegie Laboratory of Embryology, Baltimore

THE unique specimen which is herein described is of particular interest not only because abortion failed to occur for 20 weeks after development had ceased, but also because the conceptus was obtained *in situ* and therefore afforded an excellent opportunity to observe what changes had taken place in the membranes, the placenta, and the placental site, after the death of the fetus.

The question naturally arises, which degenerated first, the fetus or the placenta? Mall (1917) states that "when we consider the whole ovum, it is the embryo itself which is first destroyed." Meyer (1919, a) agrees with this statement, and the study here reported also supports Mall's contention.

CASE REPORT

On August 21, 1917, (F. N., No. G-2322), Russian, aged thirty-four, married, was admitted to the Hebrew Hospital, Baltimore, complaining of absence of menstruation. Her past history was entirely negative. She had been married nine years and had four living children. All labors and puerpera had been uneventful. She had had no miscarriages. The patient's last menstrual period before admission to the hospital began Dec. 25, 1916. The bleeding, which was profuse, was accompanied by severe pain. This period lasted four days as usual. After this occurrence, there was an amenorrhea for three months. During this time, there was morning nausea and vomiting. At the end of the three months the patient took a few hot mustard foot baths with the intention of bringing on uterine bleeding. Nothing occurred until six days after these baths, when the patient began to bleed in small amounts. Not satisfied, she went to a physician who gave her some medicine, after which the bleeding ceased. This cessation, however, was only temporary, for the bleeding recommenced and continued at irregular intervals until the time of operation.

Because of the metrorrhagia and the assumption that she had been pregnant, coupled with the fact that her abdomen had diminished in size rather than increased, the patient believed she had had a miscarriage. However, she had not at any time experienced pains suggestive of labor pains. Neither had any tissue been passed which resembled a fetus or membranes.

During the few months previous to admission, the patient had complained of anorexia and fetor oris. There had been occasional chills but no fever.

Since eight months had passed without the occurrence of a regular menstrual period and since there had been no fetal movements or marked abdominal enlargement suggestive of advanced pregnancy, the patient came to the Hebrew Hospital Dispensary to learn the cause of her amenorrhea.

Physical Examination.—The general examination was essentially negative. From both breasts a small amount of whitish watery secretion could be expressed. Abdominally, a smooth mass, evidently arising in the pelvis and extending up to the umbilicus, was felt. Vaginally, a bloody discharge was noted and the mass felt

abdominally proved to be an enlarged uterus. The temperature on admission was 99.5°, pulse 88, respirations 22 and blood pressure, 100-78. The urine was negative, as was also the Wassermann reaction of the blood. The impression recorded was, "Myomata uteri, submucous, or missed abortion."

Operation.—On the day after admission an operation was performed by Dr. Alfred Ullman, and the uterus, tubes and appendix were removed. In the operative note was found the statement, "On elevating the uterus, it was found to be symmetrically enlarged, congested and looked like a pregnant uterus." A hysterectomy was performed by Dr. Ullman because the gynecologist in charge believed the patient had a submucous myoma.

Course in Hospital.—The convalescence was entirely uneventful and the patient left the hospital on the twenty-first day after operation, feeling very well.

The patient was seen and examined by the writer in October, 1920. Her general health was very good and examination failed to show anything unusual.
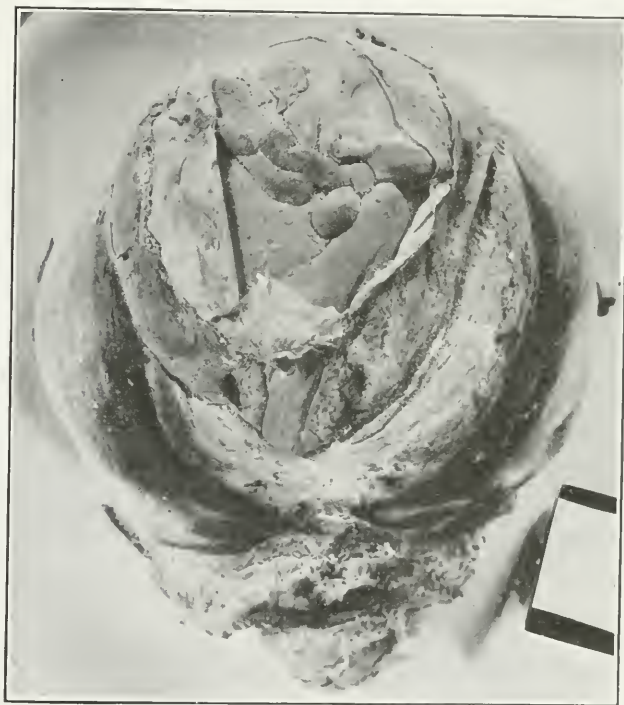
Fig. 1.—The specimen after preservation in formalin. The uterus and amniotic sac had been opened at operation.

DESCRIPTION OF SPECIMEN

The specimen is now in the Carnegie Laboratory of Embryology (No. 3024). When first seen it was found preserved in formalin (Fig. 1). The uterus had been opened and also the amniotic sac. The operator informed the writer that no amniotic fluid was found when the amniotic sac was opened at the time of operation. The fetus occupied the upper half of the uterine cavity and, as seen in the illustration, it presented as a complete breech.

This fetus belongs to the seventh group of pathologic embryos according to Mall's classification, the group being characterized by maceration of the tissues with marked distortion and deformity of the extremities and body parts.

The crown-rump measurement is 90 mm. and the foot length is 13 mm. The weight of the fetus is 24.4 gms., as contrasted with 50 gms., which is the average weight for fetuses with a crown-rump length of 90 mm. From this data, according to the Carnegie curve of growth, (Streeter, 1920), the estimated age of the fetus is between 14 and 15 weeks. However, the menstrual age, (Mall, 1918), that is, the age of the fetus as computed by the time elapsing between the beginning of the last menstrual period and the date of operation, is 34 weeks. We have therefore, a discrepancy of 20 weeks between the estimated and the menstrual ages.

In its general appearance, the fetus presents the typical mummified condition which is frequently met with in specimens belonging to this group. The sex could not be determined because of the marked degeneration in the region of the external genitalia. The skin almost everywhere is dry, rough and granular, as if something had been in contact with the fetus. The only smooth area is on the face. The color of the skin is greenish brown. It is very closely applied to the bony structures and is rubbery in consistency. The entire fetus is flattened, the width of the skull being only 19 mm. The head is markedly flexed, anteriorly and laterally, on the chest, and the extremities have assumed very peculiar attitudes. The arms are partly extended

Fig. 2.—The fetus, showing typical mummification. The skin is dry, rough and granular and is closely adherent to the bony structures. Note the peculiar attitudes of the extremities.

Fig. 3.—Left profile of fetus showing the fontanelles and characteristic posture of a mummified fetus.

from the shoulders, the forearms are very acutely flexed on the arms and the hands are hyper-extended on the wrists. Both hands rest on the neck under the chin and are markedly flattened (Fig. 2). The thighs are flexed on the abdomen, the legs are flexed on the thighs and the feet are flexed on the legs.

The head is flattened and the fontanelles and sutures are preserved. The ears are barely recognizable, while the eyes are deeply sunken and are covered by a thin membrane. The nose is flattened. Both nostrils look forward as small pinpoint openings and the face presents an atrophied or senile appearance. The body of the fetus is elliptical in outline, the greater diameter being the anteroposterior one.

An x-ray of the fetus revealed a normal condition of ossification for a fetus of 14 weeks and no deformities or anomalies of the bones.

The placenta occupies the entire posterior wall of the uterine cavity and measures 80 by 61 mm. It is firm, whitish gray and its greatest thickness is 18 mm. The umbilical cord is inserted centrally. The cord is markedly twisted as is characteristic

of mummified fetuses. This is especially obvious near its insertion, where it narrows down to a diameter of 2 mm. The greatest diameter of the cord measures 6 mm. The membranes are dry and shrivelled up.

MICROSCOPIC STUDY OF THE FETUS

The sections were cut so that the important organs of the body could be studied. These sections were stained with (1) hematoxylin and eosin, (2) hematoxylin, eosin, aurantia and orange G, (3) iron hematoxylin, (4) iron hematoxylin borax ferricyanide, (5) Mallory's stain alone, (6) Mallory's stain and picric acid. In general, all the tissues save bone, cartilage, and muscle took the stains poorly.

Skin.—The outermost layer of the body consists of tissue of varying width, very granular and partly hyalinized. No distinct cellular structure is definable. This layer has a very irregular surface and stains very poorly. Beneath it, however, for a short distance in the region corresponding to the axillary space, can be seen a semblance of skin. There is a layer of epithelial cells, four to five cells in thickness, very much degenerated and granular. The cell outlines have practically all disappeared and the nuclei are discernible with difficulty. The stain is poorly taken. This layer is wavy and is almost entirely separated from the underlying tissue. There is no evidence of hair follicles or sudoriparous glands, but a few small round cells are scattered here and there.

Subcutaneous Tissue.—Between the external layer and the striated muscle on the dorsum of the body is a layer of tissue almost three times as thick as the external stratum. This is composed of very fine granules in which can be seen numerous degenerated nuclei.

Muscle.—The striated muscles are very well preserved, the cross-striations being readily discernible. The diaphragmatic muscles, like the striated musculature elsewhere, is in good condition. The muscle sheaths are preserved and the lumina of the blood vessels are patent.

Bone and Cartilage.—These are the best preserved tissues in the body, the entire structure being perfectly retained. The vascular channels in the bodies of the vertebrae stand out prominently and are found to contain degenerated blood cells and fibrin. There are distinct centers of ossification at the bases of the transverse processes, in the bodies of the vertebræ and in the ribs.

Spinal Cord.—The central nervous system shows the most pronounced degeneration of all the tissues. The cytoplasm has entirely gone to pieces. In a few areas the tissue has undergone coagulation necrosis, but the larger portion of the cytoplasm is replaced by innumerable fine granules. No definite cell structure is recognizable. Nuclei in various stages of degeneration are seen everywhere. However, a large number of nuclei are well preserved. No definite distinction between white and gray matter can be made with certainty. There is no central canal or any trace of the anterior and posterior fissures, or the anterior and posterior roots to be seen. (Perhaps the cause for the early decay of the central nervous system was the lack of a firm connective-tissue framework.)

Meninges.—The meningeal membranes seem to be fairly well preserved and the blood spaces are patent. There is a conspicuous paucity of round cell infiltration in the spinal cord and meninges.

Liver.—The capsule is poorly preserved, but the general configuration of the liver lobules is readily discernible. The individual liver cells are muddy and degenerated, the degeneration being in the form of vacuolization and granule formation. Most of the cell outlines are vague. The stain has been poorly taken and few nuclei can be seen. The connective tissue septa are fairly well preserved, but the blood vessels have collapsed. The degeneration is appreciably more marked in some areas than in others. No round cell infiltration is noticed, but numerous fat globules are seen. No distinct bile capillaries or blood-forming cells are distinguishable.

Stomach.—The peritoneal covering of the stomach has practically disappeared. For the most part the three muscle layers are distinct and fairly well preserved, but in a few areas there is marked degeneration. The nuclei of the muscle fibers are in a fair state of preservation. Internal to the muscle layer a thin submucosa is perceptible. Of the gastric mucosa practically nothing recognizable remains and in its stead is a wide stratum of very finely granular débris, in which there is a dearth of distinct, intact cells. Glandular structures are almost entirely absent in this layer. Only a few shadows of epithelium are seen. The gastric cavity is filled with detritus of various kinds, mostly degenerated epithelial cells. Some of these cells are arranged in the form of glands or portions of glands. The nuclei in these cells are fairly well preserved. Numerous fatty acid crystals are seen.

Pancreas.—This organ has undergone striking granular degeneration. Distinct alveoli are not seen but the general contour of alveoli is maintained. Intact individual cells are seen with some difficulty. Most of the cells are granular, dull and stain very poorly. The connective tissue is much better preserved than the pancreatic cells. Blood vessels are few in number, but those present are patulous. No epithelium is visible in the pancreatic duct, but its lumen is filled with granular débris. Islands of Langerhans are not discernible.

Spleen.—Practically all the splenic pulp has been converted into a very finely granular degenerated mass which stained poorly. In a few areas, which are more homogeneous, fine needle-like crystals, probably fat crystals, are present. The walls of the blood vessels are thickened but the lumina are patent. The blood vessels, however, are few in number, and there is only a suggestion of malpighian bodies. The capsule is missing over the greater portion of the spleen, and at one point, there is firm union between the spleen and the pancreas.

Adrenal Glands.—The capsule and the architecture of the adrenals are very well preserved. It is possible to distinguish the medulla and the cortex. The hilum and cell columns stand out prominently, and in general the stain has been fairly well taken. The individual cells, however, are extremely granular and very few nuclei could be made out. Scattered throughout are small areas of grossly degenerated cells. A golden brown pigment is deposited in various portions of the parenchyma and in the connective tissue septa. Very few patent blood vessels can be seen.

Lungs.—The general structure of these organs is very well preserved and the visceral pleura stands out prominently. Connective tissue is strikingly abundant, well preserved and fairly well stained. The spaces between the connective tissue septa are filled with innumerable round, detached cells which are densely packed and do not stain well. These are degenerate cells, no nuclei being visible in them. Very few bronchioles are seen and these can be identified only with difficulty. No blood vessels can be recognized with certainty in the sections studied.

Heart.—This organ is markedly degenerated but not to such an extent as the central nervous system. The shape of the heart is retained but the cardiac musculature is very poorly preserved. Nevertheless, heart muscle fibers can be recognized, branching is visible, and a few fibers show faint striations. No distinct cardiac chambers can be made out and no endocardium can be differentiated. A thickened pericardium which blends with the visceral pleura, is distinctly visible.

Aorta.—In contrast to the heart, the aorta is very well preserved. It contains abundant elastic tissue which stains well and the intima is almost intact. The lumen of the vessels is patent and contains practically no blood cells or detritus.

MICROSCOPIC STUDY OF PLACENTAL SITE, PLACENTA, AND MEMBRANES

At the placental site, as elsewhere, the uterine musculature is very well preserved. The cytoplasm and nuclei are distinctly visible and the blood vessels are normal. Between the muscle layer and the placenta is the decidua basalis. Most of the glands in the spongiosa are widely distended and a few extend deep down into the muscu-

lature. The connective tissue between the glands is diminished to thin trabeculæ. The epithelium lining the gland cavities is either cubical or flattened out, so as to resemble endothelium. In a few glands the epithelium is separated from the basement membrane or is missing entirely. Some of the glands contain blood, desquamated epithelium and coagulum. Between the spongiosa and the muscle layer are numerous blood sinuses. In the spongiosa and extending downward into the uterine musculature for a short distance one sees sparse round-cell infiltration. Of the compacta very little remains. The decidual cells in the basalis are distinct, fusiform, clearly stained, and lie parallel to one another, arranged like chains, with their long axes perpendicular to the muscle layer. One portion of the basalis shows marked degeneration, the center of this area being almost completely hyalinized. There are a few small, papilla-like projections of decidua which extend upward toward, and mingle with, the chorionic villi. The superficial portions of these projections have undergone hyaline degeneration and have blended with the hyaline surrounding the villi.

The *villi* vary considerably in size and shape. There is very marked fibrin formation around and in the peripheral portions of most of them. In the majority of villi the fibrin is just beneath the chorionic ectoderm. There is no Langhans layer in most of them and in many even the syncytial layer has disappeared. In the latter villi a large amount of fibrin surrounds the stroma. Many of the villi show some edema and a few have undergone almost complete hyalinization. Very conspicuous is the almost entire absence of villous blood vessels or the remains of blood vessels. The few that are present are almost entirely obliterated and their walls show hyaline degeneration. In the stroma of the villi are seen numerous Hofbauer cells in various stages of degeneration, and these cells, most authors agree, are indicative of progressive degeneration. (Meyer, 1919,b.) Villi are joined to the basalis by fibrin almost everywhere. Scattered throughout the placenta are small calcified areas, syncytial buds and free masses of syncytial cells.

The *intervillous space* is filled with red blood cells, but these are mere shadows, for practically no hemoglobin can be seen in them. In this space there is a moderate number of small round cells.

The *chorion*, which is festooned, is almost entirely intact. Two distinct layers of epithelium are discernible in most places. The large cells of the Langhans layer have disappeared in a few areas. The syncytial layer is well preserved. Fibrinous degeneration is seen both beneath and above the syncytium in scattered areas. In a few places, the syncytium is heaped up. The connective tissue of the chorion is better preserved toward the epithelial surface than it is toward the amnion, the tissue in the former area being denser and more fibrillated. Towards the amnion there is marked degeneration. Distributed through the connective tissue are a few irregular masses of syncytial cells. Separating the chorion from the amnion is a homogeneous layer of connective tissue almost equal in thickness to the amnion.

The epithelial layer of the *amnion* is practically intact and only slightly festooned. It consists almost entirely of cubical cells which are very granular. The nuclei are very well preserved, but the cell outlines are difficult to distinguish. The connective tissue of the amnion presents a dense, homogeneous appearance.

UMBILICAL CORD

A cross-section of the cord is elliptical in shape. The amniotic epithelium which is found in normal cords, is entirely missing in this specimen. The periphery of the cord consists of a deeply staining, granular, necrotic layer of tissue. This merges into the stroma (Wharton's jelly), which exhibits marked degeneration and stains poorly. Stellate cells are seen everywhere but are extremely degenerated. The tissue retains its concentric arrangement at the periphery and around the blood vessels. The latter, while readily distinguishable, are poorly preserved. The vein has col-

lapsed and its lumen contains degenerated blood cells among which are many small round cells. The arteries have likewise collapsed, their musculature is degenerated and poorly stained, and they contain degenerated blood cells within their lumina. A small slit-like extension of the cœlomic cavity of the fetus is visible in the sections from the fetal end of the cord. No remains of the omphalomesenteric vessels or the yolk stalk are discernible.

SUMMARY

The features which are of special interest in this case may be briefly summarized as follows:

The discrepancy between the estimated age and the menstrual age would indicate that the fetus had been retained in utero for twenty weeks after the cessation of development. In spite of this long retention, there was no evidence of infection in the fetus or in its membranes. The most marked change was that of maceration of the fetus with absorption of its fluids and mummification of its tissues. Of all the tissues the central nervous system was most profoundly affected; the least affected were the bones and cartilages; next in order of preservation was the voluntary musculature and the fibrous tissues. Although considerably degenerated, the essential architecture can still be recognized in the liver, spleen, pancreas, adrenals, stomach, lungs and heart.

The fetal structures of the placenta show evidence of advanced degeneration, but not so marked as that of the fetus itself. The maternal portion of the placenta and the implantation site do not differ materially from those found in the normal placenta at this stage of development. We have therefore no indication in this case that the death of the fetus was due to any defect of the environment. The cause of death is more likely to be found in the fetus itself, and the case may represent one of defective germ plasm.

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Society Transactions

DR. J. W. WARNER presented a report of a case of **Fatal Rupture of a Gonorrheal Pyosalpinx.**

Mrs. M. W., age thirty-six, married five years, never pregnant. She menstruated every twenty-eight days, flowing 3 to 4 days, the amount was very moderate and there was never any pain. She was last unwell 6 weeks before her present illness, being two weeks' overdue, an irregularity which she had never experienced before. There had not been any leucorrhea, pain or any suggestion of previous pelvic inflammation.

Three days before I saw her she began to have pain in the right lower quadrant, with temperature of 100° and pulse 90. There was no vomiting or diarrhea. Some form of medication was given and in 24 hours she felt much better and continued so for another day. In the late afternoon of the third day, the pain became excruciating and was attended by vomiting and profuse bleeding from the uterus. When I saw her three hours later, the temperature was 102.5°, pulse 120 and of good quality, respiration 20. The abdomen was very rigid. A very tender mass, the size of a fist, could be distinctly felt in the right vaginal fornix. The history and clinical picture seemed to point to a ruptured ectopic gestation and operation was advised.

Upon her arrival at the hospital two hours later her temperature was 101°, with a pulse of 124, still of good quality. The white blood count was 17,800 with 92 per cent polynuclears.

Upon opening the abdomen, pus and free fluid immediately appeared. The right appendage was one abscess cavity and ruptured. The appendix was adherent to the pelvic mass and its peritoneum was acutely congested. The appendage was removed and also the appendix. As the patient's condition had become much worse, it seemed unwise to extend the time by draining through vaginal fornix and cigarette drains were used through the abdominal wound. The day after operation the temperature rose to 106.4° and she died in forty-eight hours. At the time of operation a culture was taken from the thick yellow pus, which exuded from the tube near the uterine end of the rupture and also from the free fluid. A week later the bacteriologist reported a pure growth of gonococcus. No other organism was isolated from the culture.

DISCUSSION

DR. H. N. VINEBERG.—I want to correct the impression which I evidently conveyed to Dr. Warner at the last meeting. What I said was that I had seen cases with a temperature above 101°, even as high as 103°, in ectopic, with nothing but blood in the peritoneal cavity,—no peritonitis.

In reference to this case I would say that within my experience I have seen two or three cases in women who died very rapidly, within twenty-four hours, after

rupture of an unsuspected pyosalpinx. These were women between 40 and 50 years of age, in whom there had been absolutely no pelvic history prior to the tragedy that occurred. They were suddenly seized with pain in the abdomen, and became distended, and in one case, in which no operation was done, the patient died within twenty-four hours. I had seen her in consultation. The other was practically a hopeless case. I have seen two or three of those cases in women rather advanced in years with absolutely no history prior to the attack which proved fatal.

DR. W. M. FORD.—Two years ago I was called to see a woman married about six months. She gave a typical history of a ruptured ectopic: as typical as any I have ever seen. In addition I found a mass on the right side and slight flowing. She was brought to New York with a great deal of suffering and was operated on at the Woman's Hospital. We found a rupture about the center of the tube but no ectopic and the infection was apparently of very recent date in her; though her husband gave a history of having had a gonorrhea six or seven years before, which he assumed had been entirely cured, and, in fact, had been pronounced cured, before he married.

An interesting point in this case which I wish to compare with Dr. Warner's case is the condition of the fimbriated extremity of the tube. In my case the tube was widely open and was exuding a rich creamy pus. Dr. Lawrence W. Strong cultured the pus and isolated a pure strain of gonococci.

The patient's symptoms indicated that rupture of the tube had taken place before I was summoned from New York, so that well over 24 hours had elapsed before she was operated upon. There was nothing to do but to take out the tube. She made a very smooth recovery.

In Dr. Warner's case, may I ask, was the fimbriated extremity of the tube open and was it bathed in pus?

DR. W. P. HEALY.—According to the literature, rupture of an acute pyosalpinx is a very unusual occurrence, because apparently up to a few years ago (about 1912) less than 30 cases had been recorded. It seems to me, from the discussion this evening, there are more cases occurring than are being reported. These cases, as Dr. Warner and Dr. Vineberg emphasized, are usually fatal cases. Only about 50 per cent of the cases reported recovered, and that 50 per cent of recoveries was only in cases operated on very promptly and very early.

DR. C. G. CHILD, JR.—It seems to me that one of the most interesting points in these cases is the etiology of the rupture. It is hard for me to imagine that pus tubes, growing as slowly as they do, will distend sufficiently to rupture spontaneously, unless there is some traumatic factor in the case. Neither of the reporters mentioned or even suggested the possibility of any traumatism in these two cases. I have never seen a spontaneous rupture of a pus tube except where there was trauma associated with it. I have never seen but one rupture, and that was in a case of tubo-ovarian abscess where a woman was struck in the abdomen by the pole of a wagon as she stood in front of it, which ruptured a large tubo-ovarian abscess and gave her a general peritonitis, from which she died. If these cases rupture spontaneously by distention of the fluid which they contain, of course that is an argument for early operation and not for delay.

DR. F. R. OASTLER.—In the last two years I have had two such cases in which there was no traumatism and they ruptured in exactly the same way as an appendix where there was consequent and progressive peritonitis. There was no traumatism in either case. The discussion tonight, however, was on gonorrheal rupture, not on general rupture due to infection from other microorganisms.

DR. J. W. WARNER.—I would like to briefly answer Dr. Ford's question in regard to the fimbriated extremity of the tube. There was no fimbriated extremity. It

was just one big abscess cavity, apparently an old one, in which the organisms had taken on new life. They were very active. This apparently was a very fulminating affair. Every means was used to determine whether there was any other organism in this case, but the only one cultured was a gonococcus.

DR. H. N. VINEBERG.—I would like to ask Dr. Ford whether there was a free discharge of pus from the fimbriated end and still the tube ruptured. We have all seen cases in which we happened to make a mistake and pus exuded from the tube in salpingitis, but that would not constitute a rupture.

DR. W. M. FORD.—In order to make myself clear I will state that when I put my hand into the abdomen I was fully confident that I would roll out a partly ruptured ectopic. As I delivered the right tube, I found, about its center, on the side away from its peritoneal attachment to the broad ligament, a perforation about one-fourth inch or less in diameter. There was comparatively little pus. There was some serum in the pelvis, but not very much. At the distal end of the tube there were no adhesions, that is, none that were appreciable. There may have been some trivial flakes of fibrin which I separated unconsciously. The fimbriated end of the tube at first glance appeared perfectly normal, but when the rich creamy pus which filled the fimbriated end was gently wiped away, its mucous surface was found engorged and congested. The other opening, (the rupture) was quite independent. We thought at first it perhaps was a supplementary aperture in the tube. Dr. Strong said it was not and further reported that he did not find gonococci. It was two or three days later when he reported that he found gonococci present. The pus was otherwise sterile.

DR. ARTHUR MORSE, of New Haven (by invitation) read a paper entitled

The Significance of the Bony Outlet in Perineal Lacerations, Cystocele, and Prolapse. (For original article, see p. 159.)

DISCUSSION

DR. W. E. STUDDIFORD.—I am in accord with Dr. Morse's description of the lacerations that occur in the funnel pelvis. I am not quite sure that I am in accord with his statement that the type of repair will depend largely on the symptoms the woman presented at the time the repair was made, that it might have to be more extensive than simply a slight building up of the pelvic floor.

Now, the question of the injuries to the anterior wall: There is one other feature of the pelvis to which I think Dr. Morse should have called attention or should have noted in his preoperative histories and also in the question of a prenatal consideration of the case, and that is the inclination of the pelvis. I think as we analyze our cases of prolapse of the anterior wall, those with cystocele of greater or less extent, they are very apt to fall into two classes. There is one type of the rather thin woman with poor fascial development all over the body, poor fascial supports in the pelvic floor and poor fascial supports to the bladder and the uterus. She may or may not have a difficult labor, may or may not have appreciable injuries to the pelvic floor, but she is very apt, subsequent to her labor, to develop relaxation of the pelvic floor with more or less cystocele.

A second type of case, and one in which cystocele seems to be most common, is the short, fat woman, with a pelvis that is often normal in its measurements, but with a very bad inclination, large hips and narrow waist. In the course of her labor the progress of the second stage is usually accompanied by a projection of the anterior lip, and the bladder is often rolled out long before the head gets down to the pelvic floor. In that type of case it has seemed to me the pubic arch may be

somewhat narrowed, or it may be normal, but the factor in that case is the attachment of the fascia that supports the anterior wall. The two bony supports of that fascia are directly behind the symphysis and the spine of the ischium. The remainder of the bony attachment to the white line is more or less movable and subject to pressure in either direction, and in those cases we very often find that the spine of the ischium is at a deeper level. The inclination of the fascia that supports the anterior wall is very different from that in the ordinary, normal case, and consequently during the second stage the advance of the presenting part drives it into the anterior wall. The break comes behind the head when it reaches the pelvic floor. The inclination and the general build of the pelvis has more to do with cystocele conditions and prolapse of the anterior wall than the pubic arch. The deformity resides in the narrowing of the arch, the anterior wall is pulled upward and the pressure comes against the pelvic floor; consequently the deep lacerations. Anterior tears are unusual. The head never comes in the anterior portion of the pelvis sufficiently to tear the supports to the bladder. So in figuring on the causes of cystocele a consideration of the inclination of the pelvis is quite as important as the measurements of the outlet.

DR. FRANKLIN A. DORMAN.—I feel a little dissatisfaction with Dr. Morse's theory of the production of the cystocele. I think Dr. Studdiford has expressed more accurately the separation of the fascial attachment, in describing it as an earlier affair than at the time of the extension of the head. It does not seem to me that the overextension of the head in forceps would be a factor. The natural wide arch is a saving thing as far as the perineum is concerned, and I cannot see why of necessity it should be a cause for the weakening of the fascia of the anterior wall. I do believe, however, that where the forceps come in as factors in the cystocele is in the sense that they attack the head, or advance the head, in a high median position and actually cause further trauma to the anterior wall in the way Dr. Studdiford has said. Certainly many forceps operations do produce cystocele, but many of them are applied before the cervix is completely dilated, or where there is an edematous anterior lip and where the traction has been exerted in the wrong direction; but a properly applied forceps in a head that is low down, coming out by extension under the arch, would be a safeguard.

I am in thorough accord with what Dr. Morse says about the narrow arch. I believe we should be much more on the alert to recognize the funnel pelvis, and that it is a relatively common deformity. The true obstetrician instinctively, if he does not measure every case, feels with his fist for the width of the arch. If I find there is no material space when feeling with my hand, by examining the woman with pressure against the perineum, I immediately proceed to measurements to ascertain exactly how limited it is.

I am glad Dr. Morse called attention to the inevitability of laceration. I have delivered cases, not so many of them, where I felt I achieved something even though I delivered the baby through the rectum because the head was low down (those are not cases for cesarean section) and the only space I had was in that direction. If the baby is of large size with a deformity of that sort, a man may well consider the necessity of a cesarean section. Furthermore, if the patient has had a number of serious deliveries and has had a successful repair, rather than face the high destruction of the secondary perineal repair, a selective abdominal cesarean may be proper to save the utter ruin that would follow a subsequent delivery.

DR. JOSEPH BRETTAUER.—I do not want to detract in the least from the importance of the pelvic outlet measurements as described by him. Like Dr. Studdiford, however, I feel that I would lay more stress on the inclination of the pelvis, in the consideration of the etiology of cystocele and prolapse. Of the very large number of patients observed, I cannot at this moment remember a single instance of cysto-

cele or prolapse accompanying a deep laceration of the perineum, in a woman with a steep pelvis (over 60 degrees); on the other hand, in a woman with a normal pelvic inclination, in whom the perineum was deeply lacerated, I cannot recall a case which was not accompanied by prolapse of one or both vaginal walls.

DR. O. P. HUMPSTONE.—I think the presence of an occipitoposterior position in a funnel pelvis spells as much damage to the bladder at the beginning of the second stage as it does to the perineum at the end of the second stage of labor.

DR. HAROLD BAILEY.—I have always taken a great deal of interest in the funnel pelvis since Williams popularized this work and drew our attention to Klein's early paper. We, also, check up every tear that occurs on the service, from the standpoint of the transverse measurement of the outlet. If the tear is in the hands of an intern, before criticising him we remeasure the outlet, and in almost every tear there is a narrowing of this transverse diameter, as the doctor stated. We, however, have always taught our students that in order to save the perineum, the head must be kept in extension high under the pubic arch. I firmly believe that that is not a mistake; that is to say, I believe it limits the trauma not only to the perineum, but also to the vaginal walls as well.

Now, if we accept the doctor's figures without further confirmation, we will certainly, as Dr. Brettauer said, have to accept Dr. Pomeroy's median perineotomy as the correct way for delivery, not only it seems to me in the narrowed outlet, but in the normal pelvis. It has struck me that in those cases of Dr. Pomeroy's which I have seen, there has been practically no dropping down of the anterior wall, even though some of the perineums could not be considered normal. So it seems to me that there is something in our experience which more or less substantiates Dr. Morse's figures. However, as I have not taken any series of measurements in these tears I cannot confirm them.

DR. ASA B. DAVIS.—It has been my experience, that a good deal of the destructive tearing that occurs in delivery of these cases of funnel pelvis starts higher up than in the pelvis, before the head reaches the outlet. For instance, in many of the forceps cases the vagina is rolled down and drawn across the ischial spine and the tear is started by the forceps cutting the vagina. There is actually bursting of the vagina, and I think that very often when repairs are done that is not taken into account.

DR. ARTHUR MORSE (in closing).—In this study, I did not consider the point Dr. Studdiford brought up. However, I think that this is one which needs investigation, so I am grateful to Dr. Studdiford and to Dr. Brettauer for suggesting it.

I attempted to find published statistics regarding the diameters of the pelvis in cases of cystocele and prolapse and perineal laceration, but I have not found any; and in reply to Dr. Dickinson's question, I am under the impression that there are no figures of that sort in Halban and Tandler.

If we were to consider the funnel pelvis purely from the standpoint of obstetrics, it would be interesting to present diagrams showing an even greater contraction of the outlet than that which I indicated. Under such circumstances one may have a bituberal diameter of 5.5 cm. and a spontaneous delivery. On the other hand, one may have a diameter of 7.5 cm. and dystocia. In the first instance, the lengthening of the posterior sagittal compensates for the shortening of the bituberal diameter, while in the latter case it does not.

Dr. Dorman gave me a very good text which I might speak upon for a long time, namely, the combination in the paper of a subject which has to do not only with obstetrics but also with gynecology. That was intentional. I think that men doing obstetrics ought also to know gynecology and that men doing gynecology should know obstetrics, and in this paper I purposely made an attempt to join the two subjects in order not to give you just one side.

Unfortunately, I cannot answer Dr. Humpstone's question. That is due to the fact that I was unable to determine the character of the previous labors. However, I agree with Dr. Humpstone that an occiput posterior in a funnel pelvis is a difficult problem with which to deal.

I may say also that I think Dr. Studdiford is quite right when he speaks of the perineal repair. I did not mean that one should not do a repair simply because the pelvis was of the funnel type, but I wished to point out that in an outlet of that sort if one does an extensive repair, one must look forward to the breaking down of the repaired structures at a subsequent labor.

NEW YORK ACADEMY OF MEDICINE
SECTION ON OBSTETRICS AND GYNECOLOGY.
STATED MEETING, HELD MARCH 22, 1921.

DR. CHARLES G. CHILD, IN THE CHAIR.

DR. WILLIAM P. HEALY presented a report on **Postoperative Tetany Due to Sodium Bicarbonate.** (For original article, see p. 164.)

DISCUSSION

DR. ROLPH FLOYD.—There is very little to add to Dr. Healy's report because the autopsies showed practically nothing. Autopsy was performed on cases I and IV with essentially negative results. The usual evidences of infection were notably absent. There were slight evidences of degeneration in the renal epithelium but inasmuch as these autopsies were not performed early enough to judge whether or not these changes were postmortem, they cannot be considered of much significance.

The only other lesions present were as follows: There was some irritation of the retal mucosa and infiltration of the submucosa with round cells and a few pus cells and some swelling from the exudation of serum. In both cases the appendix had been removed and there was a little traumatic scarring of the caput coli due to the operation and of no significance. In Case IV a lesion of significance was multiple focal necrosis in the liver, where the hepatic cells were somewhat degenerated, but had not entirely lost their staining power, and a limited infiltration with a few pus cells. Outside of this practically nothing was found in either case in any way related to the death of these patients.

DR. ISIDOR GREENWALD.—It seems to me that anyone who looks over the histories of these cases will agree that the administration of sodium bicarbonate was responsible for the tetany. It is merely a question of the mechanism by which it acted.

Tileston reported a case in which tetany was produced by the intravenous injection of 5 per cent sodium bicarbonate, Harrop had a similar result in a case of mercurial poisoning and Howland and Marriott observed several cases in children.

The symptoms observed, particularly in the cases under discussion, resemble those reported in fatal cases of sodium chloride poisoning.

Sodium bicarbonate acts in three ways: First, it is an alkali and may cause "alkalosis"; secondly, it is a salt and causes changes in osmotic pressure, and, thirdly, it would seem that it should produce a disturbance in the balance of sodium and calcium and other ions.

In only one of these cases was the carbon dioxide capacity of the plasma determined and in that it was 85 per cent, far above the normal. What the change in actual reaction may have been is not known.

In regard to the action of other sodium salts:—sodium chloride, sodium sulphate,

and sodium phosphate. Sodium chloride produces a disturbance in which the neuro-muscular symptoms are most conspicuous; with sodium phosphate these are much less marked. In giving sodium bicarbonate, one of the most common results is respiratory failure. Tetany may be absent.

Changes in osmotic pressure probably have something to do with the symptoms observed after injecting hypertonic solutions of sodium salts, the symptoms resembling those obtained with hypertonic glucose solutions.

But there seems to me to be no question but that some of the symptoms are due to the disturbance in the balance between the calcium and sodium ions in the blood.

DR. HARRY VAN NESS SPAULDING read a paper entitled **Papillary-Cystadenoma of the Ovary.**

This paper was collaborated with Dr. John F. Erdmann and the statistics and case records were taken from the records of the Post-Graduate Hospital.

In a review of 5,000 consecutive pathologic sections of the Pathological Department of the Post-Graduate Medical School and Hospital, cystic disease of the ovary constituted 200, or 4 per cent, and of the 200, 36 or 18 per cent were papillary. A review of the observations of others shows that the frequency varies from 10 to 27.4 per cent of all ovarian cysts. In addition the records of 13 private patients of Dr. Erdmann's operated upon elsewhere than at the Post-Graduate Hospital and three from the writer's cases, are incorporated in this paper, the observations therefore being drawn from 52 cases. A large number of cases (11 in this series) of papillary cystadenoma occur in patients under the age of 30 years.

A review of a series of papillary sections impresses one with two facts: (1) The very gradual transition, with no sharp line of distinction or classification from the benign to the premalignant, and to the typically carcinomatous picture; and (2) that a simple, apparently benign papillary area may exist in the same section with a complex or malignant field, from which clinically one can only conclude that there is no clinical method whereby the degree of malignancy can be determined except by the microscope. The last word is therefore that of the pathologist. Microscopic examination in the present series indicates that 33 per cent were benign; 16.6 per cent premalignant, and 50 per cent malignant; 22.2 per cent were bilateral and 13.8 per cent multilocular. Therefore out of the 200 cases of all types of ovarian tumors, 12 per cent were malignant or premalignant papillomas. Other observers have shown a higher percentage of malignancy. Every warty or papillary intracystic deposit and every secondary cyst, however small, should be sectioned for malignancy. These tumors show a strong tendency to bilateralism and general metastases is not rare. Bilateralism, especially as related to the solid form of ovarian tumors, usually indicates a carcinomatous process elsewhere in the body. All bilateral ovarian tumors demand a careful examination of the abdominal viscera and breasts.

The prognosis is variable. However, one must bear in mind that the papilla *per se* as implanted upon or invading the surrounding tissues or organs is never, in the true clinical acceptance of the word, benign. On the other hand it rarely shows the rapid progress of neoplasms associated with other glandular or structural tissues. Of the series of cases at the Post-Graduate Hospital 66.6 per cent were malignant or potentially so. Many of the patients are prone to live a variable number of years after operation, and have been operated upon from two to five times in a period of ten years. Certain conclusions with reference to prognosis can be drawn: When a cyst is removed intact without peritoneal contamination, it loses its prognostic interest, however malignant the pathologist may report it later; there is always that indeterminate personal equation which cannot be solved by the prognoses in other cases; prognosis as to recurrence improves with the age of incidence; in a certain number of cases where rupture has occurred and the per-

itoneum is abundantly studded with warts, ovariotomy has proved a sufficient therapeutic measure to cause a regression of the remaining irremovable peritoneal deposits. We feel that this is quite exceptional and while such patients may linger for a number of years, yet they will finally succumb to the toxic exhaustion of the malignant peritonitis. We consider papillary ovarian tumors as potentially malignant and that if ruptured they usually eventuate in malignancy. In adenocarcinoma recurrence is probable and mortality high.

Every ovarian cyst must be removed intact by abdominal section as soon as discovered. If unilateral oophorectomy is performed, the patient should be periodically examined. Careless or rough handling, resulting in intraabdominal rupture, tapping to reduce the size of the tumor, and the vaginal approach cannot be too strongly condemned.

Radium should be employed in cases in which the ovaries or the peritoneal implants could not be surgically removed.

DISCUSSION

DR. WILLIAM P. HEALY.—I should like to emphasize a point brought out in citing one of the cases. Sometimes one comes across a case of this type of papillary cystadenoma in which the condition is apparently inoperable; a celiotomy is done and one reaches the conclusion that it would be unwise to remove the mass or even a part of it, and the abdomen is closed. I had such an experience some years ago and I have had the patient remain under my observation. She had a papillary cystadenoma of the left ovary, filling the whole left side of the abdomen and entirely inoperable. After the operation the fluid accumulated much more slowly than before and a year later bimanual examination led me to believe that, while the tumor mass was much more extensive than at the time of the exploratory laparotomy, it was of a type suggesting the possibility of removal. I did an exploratory laparotomy and found it possible to remove the tumor. I did a complete abdominal hysterectomy and the patient survived and has remained well. There remained, however, numerous small wart-like excrescences on the bowel and parietal peritoneum which subsequently regressed after the removal of the greater portion of the tumor mass. So we must bear in mind that papillary cyst adenocarcinoma is something a little different from what we are accustomed to understand as cancer.

DR. CHARLES G. CHILD.—In speaking of the removal of these tumors Dr. Spaulding brought out the point that the incision should be large enough to permit the removal of the tumor without any attempt at aspiration or the purpose of reducing the size of the tumor. That is a most valuable point. In the operative treatment of all ovarian cysts one can never tell whether they are papillomatous or not, and it is advisable not to run any chance of scattering a malignant growth. It is a distinct mistake to tap a cyst before attempting to remove it through the incision. If one finds that there has already been a spontaneous rupture of one of these cysts one can be almost sure that it is a malignant papillary cyst adenoma and that there is little use trying to remove it. When a cyst has reached the stage of spontaneous rupture I have no confidence of effecting a permanent cure by its removal.

I had a case in a girl nineteen years of age who gave no symptoms except of a benign tumor on the left side. The right ovary appeared absolutely normal. The tumor on the left side was removed. Nine months later the girl returned and a tumor six inches in diameter was found on the right side. Both of these tumors were benign. The microscopical examination is sometimes uncertain because in borderline cases it is difficult for the pathologist to distinguish benign and malignant conditions.

I recall a case of bilateral ovarian tumors in which the tumors were the size of a grapefruit. The abdomen was opened and the condition seemed apparently

hopeless. There being numerous peritoneal transplants present, I had to be satisfied with the removal of a few transplants for examination. There was already a considerable accumulation of fluid in the abdomen. Two pathologists reported a benign growth and one that it was malignant. Following this a radical removal was done after which the patient improved rapidly. It is now ten years since she was operated upon and she is today alive and well and shows no symptoms of recurrence.

I had another patient who was operated upon eight years ago, now dying. When she was operated upon eight years ago she had a double salpingitis and adherent ovaries. On opening the abdomen it was found that the right ovary was cystic and adherent and it was thought best to remove it. After this the patient was perfectly well. Seven years later she began to suffer with pelvic pain and distress and was found to have a left ovarian cyst eight inches in diameter. The only symptoms were those due to pressure on the rectum and a periodical leucorrhea which was very profuse. This discharge was examined and the report came back uncertain. It was noticed that after one of these flooding periods the tumor decreased in size, and a diagnosis was made of a connection between the cyst and the uterine cavity. The abdomen was opened and found filled with peritoneal transplants, which had invaded every structure. During the past week, in order to relieve an intestinal block caused by these growths, a colostomy was performed, showing secondary involvement of all viscera, the omentum and the intestinal walls.

In operating on a papillary cystadenoma, if one is going to be satisfied with removing a single ovary, the other ovary should be kept under observation and if it shows any signs of enlarging it should be at once removed.

DR. LEROY BROUN.—I was interested in the Doctor's statement that one of five ovarian tumors was papillomatous; I thought the ratio was one to four or one to three. I am glad to be corrected. Did those include only your own collected cases, or were Kelly's cases included?

DR. SPAULDING.—Yes, Kelly's cases were included.

DR. BROUN.—The importance of this subject was brought out by Kelly twenty-five years ago when he stated that all ovarian cysts should be regarded as malignant until proved otherwise, which could only be done by removal.

I cannot agree with Dr. Spaulding and Dr. Childs as to the necessity of the large incision, extending sometimes to the ensiform. A tumor can be aspirated without scattering transplants if one uses a small needle under proper precautions. At the Woman's Hospital in the case of a good sized tumor that would necessitate an incision much beyond the umbilicus in order to remove it intact, we make a liberal incision to the umbilicus and expose the tumor. We then aspirate with a small needle fitted on to the rapid aspirating exhaust. In doing this the cyst wall is caught up on each side of the needle as soon as it becomes sufficiently flaccid to get a grasp. The cyst wall is in this way steadily drawn out of the abdominal cavity as it becomes more flaccid. By bringing down the size of the tumor one can separate its adhesions to the adjacent organs outside of the abdominal cavity, and as a result we feel that we run less risk of rupturing the thinner portions of the wall of the cyst and scattering its contents. The patient is also saved the very large incision which is undesirable if the same results can be accomplished without it. The large incision, while formerly much in vogue, has been practically abandoned in favor of aspiration with a small needle which with the precautions cited has been most satisfactory in our hands.

DR. SPAULDING, in closing.—Although I have the highest respect for Dr. Broun's opinion, in view of his very large experience, nevertheless I feel that there is no mechanical method of tapping an ovarian cyst, regardless of how carefully the technic is carried out, that is not accompanied by some leakage. Personally, I have never seen a case tapped where there was not some amount of peritoneal con-

tamination. Large cysts are usually pseudomucinous, but occasionally, we find in them papillomatous implants and in tapping one may therefore do harm. Furthermore, with the use of a small needle it requires a long time to evacuate a large cyst and at times the cyst contents are so gelatinous that they will not readily pass through the needle; or the cyst may be multilocular and several attempts must be made to evacuate the various loculi.

Most of these cysts are adherent and it takes a large incision to deliver them, in toto, but the length of the incision is a minor consideration compared with the success of the operation. It is an honest difference of opinion I have with Dr. Broun, but I strongly feel that the patient is much better off if these cysts are dealt with in a way which will not contaminate the abdomen, namely, a sufficiently long incision to secure its delivery intact if possible, without tapping.

Dr. S. J. Scadron read a paper entitled **Episiotomy in Primiparous Labors.**

Dr. Scadron called attention to the impossibility of predicting the amount of damage to fascial and muscular structures by the descent of the head in the second stage of labor. Although a fairly large percentage of primiparae undergo normal labor with absolutely no injury to the vaginal tube, lacerations of the lower birth canal in his personal experiences as well as in the service of the Jewish Maternity Hospital showed that this injury occurs in about 45 per cent of all primiparous labors and in about 10 per cent of multiparous births. One of the important factors which underlie damage to the supporting structures of the bladder is the pressure which follows voluntary efforts at expulsion. As the head descends, the anterior vaginal wall is pushed down in front of it and sometimes becomes caught between the advancing head and the symphysis. A timely median incision anterior to the sphincter would, according to the speaker, prevent the overstretching or tearing of the urogenital structures and the bladder attachments. The perineal structures are likewise subjected to laceration as the head descends further and either a central or lateral incision will save the perineum in such cases. Dr. Scadron stated that there were other indications for episiotomy besides the prevention of cystocele and rectocele and claimed that it competes with low forceps, as after the incision is made the head can be easily expressed with gentle hand pressure from above. Prolonged delay of the perineal stage with threatening asphyxia of the child must also be considered, especially in elderly primiparae with rigidity of the perineum. In breech extraction episiotomy should also be performed as a prophylactic measure, the perineum being incised before the breech is delivered, which renders it more easily possible to bring down an unexpected extended arm and an easier delivery of the aftercoming head. In edema and other inflammatory conditions of the vulva it is also advisable to make an incision. Dr. Scadron advises cutting the perineum with a straight and blunt-pointed scissors, using the finger as a guard in the vagina. The incision should extend about one inch to one and one-half inches on the skin surface of the perineum and may be extended further if necessary. In lateral episiotomy the incision is made through the skin and subcutaneous tissues, the length of the same being gauged by the presenting part. For the repair of episiotomy wounds the speaker recommends chromic or plain catgut, preferring the latter. A median incision is followed by better union and lateral episiotomy should therefore be performed only in case of persistent occipitoposterior positions, especially when attempts at rotation are made with forceps. Dr. Scadron also prefers the lateral incision in breech extractions in primiparae.

DISCUSSION

DR. FREDERICK C. HOLDEN.—I am always glad to hear another paper on episiotomy, the idea being that the more papers we have on the subject, the more

likelihood that those still opposed to the operation may come over to the idea that there may be something in it. I am surprised at the number of men still opposed to this procedure, and I cannot understand their attitude, or see why they hesitate to do it. I use it in about 90 per cent of my primiparous patients. The results are excellent though I do not think that it always prevents cystocele. One frequent mistake is that it is not done soon enough. I use a knife instead of shears. The distance between the vulva and rectum varies in different individuals, and in some there is very little space to cut. I think that if we hammer away at this subject, men will come to recognize that episiotomy really does help and that the patients in whom it is used do not come back with a relaxed vagina.

DR. HERVEY C. WILLIAMSON.—I cannot see how a median episiotomy is going to prevent a cystocele, as it is not done, as I see it, until the head is on the perineum, and if there is going to be a cystocele the damage has occurred before the episiotomy is performed.

I have never heard what happens in subsequent deliveries, when there has been a tear into the rectum. Do you perform median episiotomy a second time, and are they successful?

I have always preferred the lateral episiotomy.

DR. CHILD.—Dr. Scadron's paper gives very well the indications for episiotomy, and with certain minor details I agree with him fully.

In regard to median episiotomy saving the bladder supports I do not agree, but I think Dr. Scadron said "might probably save," so there is no occasion for criticism on that point. The bladder supports have of course been interfered with long before the head reaches the perineum, if the bladder is distended, which seldom happens today in a properly conducted labor.

I have practiced episiotomy for many years, ever since I studied in the Rotunda Hospital of Dublin, but I have always used the lateral incision. I never could see any reason for injecting median episiotomy into the question. At this stage of labor our main thought is to prevent a solution of continuity of the tissues between the vulva and the rectum and yet with median episiotomy is produced the very condition that we wish to avoid. We do not so much fear a lateral tear even if it extends up to the broad ligament, but we do fear a tear into the sphincter and this happens very frequently with median episiotomy. It is furthermore in a very unsurgical location so far as drainage is concerned. The median line is directly in the line of all lochial discharges, and is especially liable to infection if the incision is closed with catgut. On the other hand, the lateral incision is well up out of the area of lochial drainage. I believe one gets a higher percentage of primary unions with the lateral than with the median episiotomy. I believe also that nonabsorbable suture material . gives better results than absorbable. In operations about the vagina I always use silkworm gut.

The proper time to make the incision Dr. Scadron did not dilate upon. There should be a thorough inspection of the vagina between pains as the head descends and as soon as one sees that the limit of stretching has been reached and that little tears are beginning to appear in the vagina or fourchette then is the time to make the cut but only through one levator ani muscle. This does not separate the transverse fibres of the levator ani muscle as the median incision does.

DR. SCADRON.—In many of my cases that present themselves 8 to 10 weeks' postpartum I find that on examination I cannot recognize any scar tissue, and have to refer to my history cards to find out whether or not the patient has had an episiotomy, thus showing that there is very little cicatricial tissue with median episiotomy in a large percentage of cases, especially when the repair is made layer by layer

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

The Views of Primitive Peoples Concerning the Process of Labor[*]

By JONATHAN WRIGHT, M.D., PLEASANTVILLE, N. Y.

THE most profuse notes to be gathered from the literature of the
medicine of primitive man have to do with childbirth. There is
probably no one assertion made in regard to him, which is so well
known to the generality of civilized people as that which declares he
is brought into the world with infinitely less of the travail of maternal
suffering and with less of the pomp and circumstance that attends the
arrival of an heir to our present first families. A careful examination
of the testimony establishes much reason to believe that this is true,
especially as to the pain suffered by the parturient woman. The im-
pression to be gathered is that this belief has arisen fundamentally
from phenomena exhibited by the primitive mother dependent upon
her psychology and environment, and upon the general attitude of
primitive man towards pain. There can be no doubt that close con-
tact with a nature whose processes are governed by laws unmodified
by the culture of civilized man, which to some extent has abolished
avoidable physical pain, but to a larger extent has rendered man more
susceptible to unavoidable physical suffering, lies at the bottom of
this difference, but it is not everywhere apparent. However, it will be
well to mention first the testimony which exhibits the childbearing
woman in low social cultures as apparently standing in no pressing
need of the luxuries of chloroform and "twilight sleep." However
that may be even in the reindeer period of culture in Europe there was
a need felt by parturient women for help at the time of childbearing.
Upon a reindeer bone Piette has discovered a scene delineated which is
called the "Rite of the stride over the pregnant woman."[25] A male
reindeer is standing over the prostrate form of a woman in labor lend-
ing her strength and efficiency in the bearing of a child by his presence.
The soul of the reindeer we may find, quoted by Mr. Fiske[26] from
Tylor apparently, as being decoyed into a sick Lapp or Chukchee to
act as a tonic for his recovery and in this picture we see that useful
animal again exerting his beneficial powers.

Williams[27] in 1858 said of the Fijian women that generally they
suffer little in parturition. The Tongan mother on the birth of the
child gets up directly and bathes in some pond or river and on her
return eats freely of food, but the Fijians profess to keep to the house

a few days and some lie at their ease a full month. The Australian black women are pounded and speared and cut and knocked and abused, until no doubt the bearing of a child or two is a mere drop in the bucket of their miseries which they make light of. Among the cannibals of Australia "the birth of a child does not seem to give the mother much trouble. She goes a short distance from the camp, together with an old woman, and when the interesting event has taken place and the child has been washed in the brook, she returns as if nothing had happened, and no one takes the slightest notice of the occurrence."[28] Curr[29] in his résumé of the accounts of the Australian races says: "Aboriginal women generally suffer less, on the whole, during parturition than white women do. I attribute this to their bodies being allowed to develop in childhood without the restraints and injuries which result from the use of stays, corsets, and other civilized appliances." Roth[30] quoting from Davies says of the Aborigines of Tasmania: "When a woman was taken in labor, the tribe did not wait for her, but left her behind with another woman and she afterwards followed as best she could." In the Andaman Islands "no instances of difficult delivery are known"[31] and they rarely suffer much. In New Guinea "the pregnant woman works in the fields until the beginning of the labor pains."[32] Sometimes the woman stays a month in the hut after childbirth. "I have seen one of them walking around with her new-born child two days after delivery." Among the Malays "delivery, as a rule, was attended by very little difficulty, the woman usually resuming the ordinary avocations after three or four days' seclusion."[33] Brown[34] speaks of delivery among the Melanesians and Polynesians as "generally easy," the woman being soon able to busy herself about her domestic duties, sometimes even a few hours after the event. Of the Bedouins of the desert Burckhardt[35] said in 1831 "their women suffer but little during parturition and they are often delivered in the open; when this occurs the mother rubs and cleans the child, as soon as it is born, with earth or sand, places it in her handkerchief and carries it home. If she feel the symptoms of labor while mounted on a camel, she alights and is delivered behind the camel, so that no person may see her, and then immediately remounts." In Alaska "the majority of Thlinget women suffer very little, and some not at all, when their children are born. They have been known to give birth while sleeping."[36] Schoolcraft[37] has this to say of the North American tribes: "Parturition, with the Indian female, is seldom attended with severe or long-continued suffering; it is generally very much the contrary, and leads to but a slight interruption to her ordinary pursuits. To linger back a few hours on a journey in the forest, is often the whole time required by the confinement; and there appears in most cases to be but little, if any premonition. A wife has been known to sally into the adjoining forest in quest of dry limbs for firewood, and to return to the wigwam with her new-born child, placed carefully on the back-load. The wife of Saganosh was passing with her husband and family in a canoe, along the precipitous sand-cliffs of Lake Superior, which are called Grandes Sables. There is, in general, but a strip of beach between the precipices and the water, and the scene is nearly as denuded of trees or bushes as the deserts of Arabia. But she landed in haste, and described a few bushes in a depressed spot, which sufficed for her accouchement chamber, and in a few hours was in her canoe again with the newborn babe. Their exemption from the

usual sufferings of childbirth may be said to be the general condition of the hunter state, and one of the few advantages of it which the female enjoys above her civilized sister. But it will be seen to be the simple result in obstetrics of the continued exercise in the open air of the Indian woman, and her consequent hardihood." Again he says: "It is an established rule, that pregnant women be entirely alone at the time of delivery; and this rule is rigidly adhered to. Nature seems to have fortified them with strength to undergo the operation without assistance. On the 12th of December, 1790, four women came from the white ground, ten miles from Little Tallassie, to sell horse-ropes to the beloved man. The day was cold and rainy, with a sleet of snow; they stayed all night. About midnight one of them, a young woman, was taken in travail; her mother was with her, and immediately ordered her to take some fire and go into the swamp, about thirty rods from the outhouse where they slept. She went alone, was delivered of her child, and at ten o'clock next morning, being bare-footed and half-naked, took the infant on her back, and returned home through the rain and snow, which still continued to fall, without the least apparent inconvenience."

Doubtless this kind of testimony might be increased in amount and perhaps in force. On the contrary, many are the instances related of comparatively painless childbirth by civilized women,—women delivered one day who do the family washing the next. Doubtless also, except for conventional usage and prejudice, considerable numbers of the modern women who now languish for weeks under the fluttering care of the monthly nurse, are quite able to be up and around in a day or two after parturition. While this seems all very probable, it is impossible to calculate the number of women, who under such a regime would perish or would be invalided for life. In other words we simply see here, by this analysis, the process at work, with which we are all more or less familiar, in the popular biological discussions of the day,—the selection of the unfit,—that is unfit for life under savage conditions—perhaps not too fit for civilized conditions. It is not worth while to push the argument further but we may at once turn to the evidence to be gathered which points to the conclusion that the wild woman also has her "bad times," to the evidence presented by selection "in the doing." First a conjecture of Avebury from prehistoric evidence: "From the numerous cases in which the bones of an infant and a woman have been found together in one grave, it would seem that if any woman died in childbirth, or while nursing, the baby was buried alive with her, as is still the practice among some Esquimaux families." This may be due to the vicious habits of indolence, charged against the cave woman as against her of the modern boudoirs. Many of the figurines, found in the caverns, where the Cro-Magnon or the Grimaldi race produced the wonders of the Aurignacian era, when of women, depict her in the enceinte state; her corpulent condition in contradistinction to the representations of man, who is never shown as obese, argues Osborn,[38] intimates her highly fat and nutritious diet and her sedentary habits. As for the Esquimaux: "For a certain length of time after a child is born the mother must remain in her own home, visiting no other tupic or igloo. The period for which this limitation holds good varies, sometimes reaching to the length of two months."[39] Doubtless this limitation is a sort of taboo, and little more can be said for our own "lying in" periods. We have seen the sharp line drawn between

the customs of some of the Fiji women and the neighboring Tongans, as related by Williams. The report of Hale[40] would indicate also that differences exist among the Fiji women as to the time allotted for their lying-in period as they do among us. "Parturition is not usually severe, and some women have been known to go to work within an hour after delivery, others, however, remain under the nurse's care for months. It is the prevailing opinion that hard work makes the delivery more easy. After childbirth the women usually remain quiet, and live upon a diet composed of young taro-tops, for from four to eight days, after which they bathe constantly." We shall see that not only, according to Stuhlmann,[41] in the heart of Africa some of the Wambuba women die in childbirth and that postmortem cesarean section is performed in order that mother and child may be buried separately, but according to Felkin[42] in a neighboring tribe cesarean section is performed on the living woman for difficult labor. In West Africa death from delayed labor occurs, but it is looked on as a disgrace. "The body of a woman dying in confinement is treated with contumely and is burned as is everything else belonging to her."[43] The Papuan women, according to Neuhauss,[32] are so fearful of the pains of childbirth that they attempt to prevent the continuation of pregnancy. Some understanding of the anatomical changes, giving rise to severe pain in parturition is entertained by the Chuckchees of Northeastern Asia. "Immediately after the delivery, the body of the woman is tightly bound around the hips with a cord in order to bring the bones of her body in their former position. The Chuckchee believe that, without this, the woman will become sickly, and that her life will be shortened."[44] In some of the North American tribes[45] the most accomplished of the medicine-men practiced a primitive surgery aided by external manipulation and otherwise in difficult labor. Among the Polynesians generally "any difficult case was attributed to witchcraft, and prayers were offered to the spirits of dead ancestors to counteract the spell."[46] Of the Ainu[47] it is said that especial care is given to childbirth and various magical measures are in use to quiet the afterpains. In Schoolcraft's work, Williamson[48] refers to tedious labor among the Dacotah Indians, for which the rattles of a rattlesnake are shaken to stimulate the sluggish energies of the tardy child lingering in his mother's womb. If a woman of the Lushei Kuki clans[49] in India has difficulty in bringing forth, a fowl is killed and magic rites are practiced to help her.

It seems, from this cursory review of the existing testimony, that it is a question of considerable doubt, to say the least, if, given the greater hardihood in the bearing of pain, the lot of the wild woman in her pains of childbearing is less severe than that of her civilized sister. Much has been said of the smaller heads and the larger female pelves of the primitive races of womankind, but the anatomic studies in support of this have been insufficient. The interference of modern science has ameliorated woman's sufferings and often has saved her life, but there is no reason to suppose that other differences than those of environment exist.

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Selected Abstracts

The Pathology of Ovarian Neoplasms

Goodall: The Origin of Tumors of the Ovaries. Surgery, Gynecology and Obstetrics, 1920, xxx, 249.

Goodall takes up the origin of epithelial tumors of the ovary and, as a basis, devoted a great deal of time and painstaking work to determine the origin of the epithelial structures of the ovary, most of which are represented in the mature organ only by "rests" due to malformation or, more generally, due to an arrest of normal retrograde changes. His material consisted of human ovaries in all stages of development as well as those of various lower animals. The ovaries of the bitch and cow were found to be especially useful, for in them the fetal structures persist largely to maturity. However, he found this persistence of epithelial structures to vary widely not only between different species, but in various individuals of the same species, and even in the two ovaries of the same individual, especially the human.

That real tumors develop from graafian follicles is doubted by Goodall who agrees with Nagel that "hydrops folliculi" represents nothing more than unusually large healthy follicles. He also doubts that the follicular cells of primordial cell nests ever give rise to tumors.

Parthenogenesis having been established by many investigators, es-

pecially Loeb, the origin of dermoids and teratomata from ova seems established, teratomata having been found only in such locations where aberrant ovarian rests are, at times, encountered.

Since peritheliomata occur eight times more frequently in the ovary than sarcomata, Goodall assumes they originate from the interstitial cells which occupy a position morphologically between the epithelial and connective tissue cells. R. E. Wobus.

Frankl: Ovarian Carcinoma. Archiv fuer Gynaekologie, 1920, cxiii, 29.

In a paper of more than 100 pages the author presents a most exhaustive discussion of this problem, based on a study of the pathology and clinical course of 65 primary and 23 secondary cancers of the ovary. The wealth of material offered in this article renders the presentation of its contents in form of a short abstract impossible. For the clinician it seems interesting that Frankl is most favorably impressed with the results of x-ray treatment subsequent to operation. Whenever an ovarian carcinoma is suspected a careful search must be made for a possible or probable primary neoplasm in stomach or intestines. The frequency of metastatic growths in uterus and adnexa calls for routine total hysterectomy in every case of ovarian cancer.

Hugo Ehrenfest.

Frankl: Carcinoma of an Ovarian Dermoid. Zentralblatt fuer Gynaekologie, 1920. xliv, 373.

The author found only 60 cases of this sort recorded in literature. His new case exhibits interesting anatomic peculiarities. The presence of locks of hair in three separated cavities clearly established the origin of the carcinoma from multiple dermoids.

Hugo Ehrenfest.

Boettger: Cornification of Squamous Cell Carcinoma of the Ovary. Monatsschrift für Geburtshülfe und Gynäkologie, 1921, liv, 22.

The author reports the case of a woman 59 years old, who had bilateral ovarian tumors; the right mass was as large as a child's head and the left the size of a clenched fist. At operation the former was removed, but because of the discovery of nodules that were apparently carcinomatous metastases, the left tumor was left in situ.

Upon examination the excised tissue proved to be a double tumor; a dermoid cyst undergoing carcinomatous degeneration accompanied by a teratoma of the ovary. In the wall of the former there was very profuse cornification of the epithelial tumor cells.

The question of the origin of the horny layered epithelium is considered in some detail. In the ovary there are present three types of epithelial cells, from which carcinoma can possibly develop: the surface or ovarian epithelium, the epithelium of the follicle, and the cell-foci of Walthard, which probably represent remnants of Pflüger's cell columns. From none of these can a squamous cell carcinoma develop or at least not the form showing cornification. True squamous-cell carcinoma can then only develop from dermoid cysts or from teratomata, or may appear as metastasis from distant organs.

To describe the tumor found in his case the author introduces the

term "Malignant Dermoid", which he defines as a teratoid tumor in which derivatives of all three germ layers are present, but which are distinguished by the absence of a typical dermoid basis as evidenced by the sparse development of hair, teeth and bony tissue.

The older authors are quoted to show the great divergence of views regarding the origin of similar rare tumors.   E. D. PLASS.

Eisenstaedter: Carcinomatous Dermoid Cysts of the Ovary. Monatsschrift fuer Geburtshuelfe und Gynaekologie, 1921, liv, 360.

Of 209 ovarian tumors operated upon, 193 were cystic, and only 16 solid. The cystic tumors comprised: 153 benign cystomas, 24 carcinomatous cystomas, 13 dermoids, and 3 carcinomatous dermoids. Of the 16 solid tumors 2 were fibromas, 1 sarcoma and 4 carcinomas. Thus in a total of 16 dermoids 3 were shown to be carcinomatous. They are described and discussed in this paper. The author accepts O. Frankl's classification of the genesis of cancerous dermoids. They comprise the following types: (1) The carcinoma develops within the dermoid, or (2) it transgresses from the remaining ovarian tissue into the dermoid. In the first group the carcinoma is as old as the dermoid or developed later, primarily in it or metastatically. In the second group the growth proceeds either from a primary solid ovarian carcinoma, or from a malignant adenocystoma, or it represents a metastasis.
                                    HUGO EHRENFEST.

Benthin: Unusual Radiotherapeutic Observations. Monatsschrift für Geburtshülfe und Gynäkologie, 1921, liv, 34.

Benthin recites several unusual results apparently resulting from x-ray therapy in malignant conditions.

In the first case the patient had been given nine radium treatments and sixteen x-ray applications, following vaginal hysterectomy for carcinoma of the cervix. Two years later there appeared an ulcer of the rectum. The next year a multilocular ovarian cyst showing carcinomatous degeneration was removed.

The second patient had a vaginal hysterectomy for cervical carcinoma and eighteen months later came to the clinic for radiation because of a recurrence. Intensive treatment continued over four months and was followed by an improvement of the local conditions. An ovarian cyst appeared, however, and grew so rapidly that it was removed and showed marked carcinomatous degeneration. Death occurred within a few months from metastases.

It seems that in these cases the raying of the pelvic tissues bore an etiologic relation to the subsequent development of the ovarian carcinoma.

A third patient had marked pigmentation of the entire body after x-ray and radium treatment following operation for ovarian carcinoma.

The fourth patient was x-rayed in an attempt to control a very severe menorrhagia but in spite of heavy doses there was only a slight effect on the condition and during the three years of intermittent treatment the patient twice became pregnant and bore healthy children. This would indicate a great individual variation' on the part of the ovarian tissue to the action of the x-rays. Other authors, Hei-

mann, Baisch and Werner have reported similar cases in which pregnancy occurred in spite of x-ray treatment to relieve metrorrhagia.

The last case developed a "radium ulcer" of the rectum after treatment following operation for malignant disease. Examination of the base of the ulcer showed no evidence of carcinoma.   E. D. PLASS.

Reel: Krukenberg Tumor of the Ovary. Annals of Surgery, 1921, lxxiii, 481.

Fibrosarcoma ovarii mucocellulare carcinomatodes was first described by Krukenberg in 1896. Since then 56 additional cases have been recorded. In 20 of these, including Reel's case, the primary growth was situated in some portion of the gastrointestinal tract.

The case here reported occurred in a white girl of 21. She was quite well until symptoms suddenly appeared which indicated some acute abdominal condition. The ovarian tumors, as is frequently the case, were bilateral. The initial lesion was probably in the stomach, metastases being found widely distributed.

The patient lived for two months after removal of the ovarian tumors, no attempt having been made to remove the primary focus.

R. E. WOBUS.

Major: A Study of the Krukenberg Tumor. Surgery, Gynecology and Obstetrics, 1918, xxvii, 195.

Major analyzes the cases of this type heretofore reported and adds an observation of his own. The patient was a colored woman of 40 who came to autopsy after having died from progressive weakness, having lost 80 pounds in weight. The ovaries were the seat of nodular tumors, each about 7x9x7 cm. The anterior surface of the shrunken stomach was covered by wart-like tumors. An enlarged lymph-gland was found at the hilus. A few small tumor growths were seen on the jejunum, but the liver was not involved. Careful study revealed the presence of occasional groups of tumor cells in the pulmonary vessels; in a few places these cells had grown into the lung tissue, forming microscopic metastases.

Major feels that the tumor is essentially a carcinoma which is, in the majority of cases, secondary to carcinoma of the stomach or intestines. The original tumor being a slowly growing scirrhous growth, may be easily overlooked. Surface infection may explain the metastases, but his finding of cells in the blood vessels suggests a spread by way of the blood stream.   R. E. WOBUS.

Chapman: Krukenberg Tumor. Surgery, Gynecology and Obstetrics, 1920, xxxi, 58.

A girl of 14, who had menstruated once two months previously, was suspected of being pregnant on account of a rapidly growing enlargement of the abdomen. Examination disclosed what appeared to be a lobulated ovarian tumor extending almost to the ensiform. At operation there were found two tumors of almost equal size, one originating from each ovary, weighing six and seven pounds respectively. Microscopic section showed a diffuse myxomatous structure with liquefaction areas and the typical signet ring cells, the whole picture being

that of the "Gallert Krebs" first described by Krukenberg. A tumor the size of a silver dollar was found in the anterior wall of the stomach, probably representing the original focus. Enlarged lymph glands were encountered in the gastrocolic omentum.

Although the child recovered from the operation she died 20 days later, apparently from exhaustion.   R. E. WOBUS.

Kynoch: Primary Chorionepithelioma of the Ovary. Edinburgh Medical Journal, 1919, xxii, 226.

Primary chorionepithelioma of the ovary is rare and some authorities consider the ovary to be by far the most unusual site for the extra-uterine development of this type of malignant tumor. A paper of Fairbairn (published in Jour. of Obst. and Gynec., British Empire, July, 1919) covered this subject thoroughly, discussing a personal observation and two very similar cases from Doederlein's clinic. Kynoch's additional case pertains to a nullipara, age 24, who after an amenorrhea of eight weeks had bled persistently for six weeks. A large, nodular left ovary of dark purple color was removed. It proved to be a chorionepithelioma. A month later a soft tumor was discovered in the abdominal scar, regarded as being a hematoma. After a few attacks of vomiting and diarrhea the patient died about three months after the first operation. A large metastatic growth filled the pelvis, smaller metastases were also found in the lung.

It was impossible to determine whether the chorionepithelioma had developed from a previous pregnancy or from a teratoma of the ovary.
                                        HUGO EHRENFEST.

Glynn: A Comparison between Ovarian "Hypernephroma" and Luteoma and Suprarenal Hypernephroma, with Comments on Suprarenal Virilism. Journal of Obstetrics and Gynaecology of the British Empire, 1921, xxviii, 23.

Nearly 40 years ago Grawitz first propounded the theory that certain renal neoplasms were developed from misplaced "rests" of the adrenal cortex. These neoplasms were subsequently named hypernephromas.

Peham (1899) described a large solid tumor of the ovary, which on account of its macroscopic and microscopic appearance, and the supposed occurrence of suprarenal cortical tissue in the ovary, he called "hypernephroma." Several other cases of this sort have since been published. In the last few years, however, the ovarian "hypernephroma" theory has been abandoned by many authorities who regard these tumors as derived from lutein cells, or at least not from the suprarenal cortex.

From a most careful study of all the available material Glynn concludes that it is very doubtful whether a single case of genuine ovarian "hypernephroma" has yet been recorded. For this doubt he advances a number of additional reasons which so far have escaped the notice of critics.

1. *Embryological.* Suprarenal cortical tissue is frequent in the broad ligament, yet there is no proved case of its presence in the ovary.

2. *Histological.*—The large ovarian "hypernephromas" are unlike the

large primary, and usually malignant, growth of the cortex of the supra-
renal gland itself; but they are usually, clinically and structurally, like
other large tumors described as lutein growths.

3. *Clinical.*—The large ovarian "hypernephromas" are not associated
with the changes in secondary sex characteristics, as hirsutes, etc., which
are so frequent with suprarenal cortical tumors in young children, espe-
cially girls, and in women before the menopause. These sex changes, on
the other hand, never occur with lutein tumors.

There is, however, one case on record of the much rarer hypernephro-
mas of the broad ligament—a locality where accessory suprarenals are
common—which did cause changes in sex characters, and histologically
appeared like a true suprarenal hypernephroma. HUGO EHRENFEST.

Herzog: Melanosarcoma of the Ovaries. Zeitschrift fuer Geburtshilfe und Gynaekologie, 1918, lxxx, 576.

Melanosarcomas, the most malignant neoplasm in human pathology,
are found in the ovaries almost only as metastases in cases of general
melanosarcomatosis. However, there are a few instances of primary
affections of the ovaries on record, of which Sonbeyran and River, in
their latest compilation, mention seven. Since that time Cottam and
Markus each have added one more case. According to Frankl liter-
ature contains reports of 40 cases of secondary ovarian melanosarcoma.
In the opinion of Herzog doubt may be raised against the genuineness
even of these 9 presumably primary growths. Only the two cases of
Amann and Lorrain, respectively can be accepted. In them the sar-
coma developed from a teratogenous skin "anlage" in the ovaries.
Most probably all melanomas originate from tissue which contains
pigmented cells, mostly from cutaneous nevi. The secondary ovarian
melanosarcomas, like in the two cases now recorded by him, appear as
a rule in two types: a large, homogenous tumor completely substitutes
the ovary, or the ovarian tissue contains disseminated small tumors.
Pregnancy markedly favors the growth of this neoplasm, and under
these conditions the ovaries exhibit a distinct predisposition for the
development of metastases. HUGO EHRENFEST.

Young: Primary Echinococcal Invasion of the Ovary, with Notes on other Pelvic Hydatids Collected from Various Sources in Australia. Journal of Obstetrics and Gynaecology of the British Empire, 1914, xxvi, 207.

Primary hydatids of the ovary have been especially studied by Bland
Sutton, who found all available records unreliable. He considers that
the immunity of the ovary (and also of the testis) to hydatid invasion
is due to the fact that it lacks a loose serous investment. The case
of the ovary is particularly deceptive, since hydatids arising in the
broad ligament tend, by their progressive enlargement, to stretch the
ovarian tissue along their periphery. However, a true case of hydatid
of the ovary has been reported by Jéan, and another observation of this
sort is claimed by Allen.

Young also feels sure that in his case the right ovary alone was the
seat of a hydatid cyst, between 7 and 8 cm. in diameter, with several
exogenous daughter cysts in its wall.

In response to an inquiry among surgeons throughout Australasia
Young received notes concerning a number of observations, hitherto
unpublished, which he presents in this paper.   HUGO EHRENFEST.

Forgue and Chauvin: Tuberculosis of Ovarian Cysts. Revue de Chir-
    urgie, 1919, xxxviii, 881.

The writers state that only 35 observations of this occurrence have
been recorded in literature. Tuberculous ovarian cysts can be divided
into three separate groups: (1) Tubo-ovarian cysts, really tubo-ova-
rian tuberculous abscesses; (2) Ovarian Cysts with an external infection
with tuberculosis, usually associated with a tuberculous peritonitis, and
(3) Ovarian Cysts with infected contents. In this form the ovarian in-
fection practically never is primary, the primary focus as a rule being
found either in the peritoneum or the tube.   HUGO EHRENFEST.

Aimes: Torsion of Ovarian Cysts. Progrès Médical, 1920, Number
    45, p. 483.

Aimes considers the various aspects of ovarian cysts with twisted
pedicles. From the study of the literature, since no personal cases
are cited, he finds that there are no reliable statistics regarding the
frequency with which the pedicles of such cysts may be twisted. The
accident may occur at any age, being more frequent between the ages
of 25 and 50, presumably because more cysts occur during these age
periods and since the causes of the twisted pedicles operate more
frequently during these years.

Torsion occurs more frequently with movable than with adherent
cysts. The same is true of small in comparison with large cysts. It
naturally follows that the pedicles of dermoids are more frequently
found twisted than is the case with the mucoid variety.

The causes of movement of these ovarian cysts are of either external
origin, from conditions giving rise to a rapid change in the equilibrium
of the abdominal cavity or of internal origin from a change in volume
of the surrounding organs. The rotatory motion necessary to produce
this twist may be explained by the fact that when forces are applied
tangentially to the surfaces of symmetrical organs such a motion re-
sults. Also it is well-known that a spheroid body when compressed be-
tween two movable points will tend to rotate. On the other hand
if the cyst is not symmetrical there will be a tendency to rotation be-
cause of the unequal enlargement of its various parts. After rotation
has begun and the veins of the cyst become congested, increased rota-
tion results because the congested veins tend to form arcs which exert
a twisting force.

Torsion occurs most frequently in right-sided cysts. These tend to
rotate in a clockwise direction while those of the left side rotate in a
counter-clockwise manner. Pathologically, twisted cysts of the ovary
present a picture of venous stasis or gangrene, depending upon the
completeness of the rotation and the consequent interference with the
blood supply. There is an accompanying peritoneal reaction which,
in the greater percentage of cases, is aseptic.

The clinical picture varies from that of intense pain and severe
shock to that of slight recurring attacks of generalized abdominal

pain, dependent upon the acuteness or chronicity of the process. The more common condition with which twisted cysts of the ovary may be confused are: twisted pedunculated fibroids; interstitial hemorrhages in fibroid tumors; torsion of a hydrosalpinx; ectopic gestation; and acute appendicitis.

Aimes finds the mortality to be about 7.6 per cent attributable more often to peritonitis than to hemorrhage, these two conditions being the complications of greatest danger. Palliative treatment may be applied but the only curative treatment is the removal of the cystic mass by operation.   THEODORE W. ADAMS.

Downes: Tumors of the Ovary in Children. Journal American Medical Association, 1921, lxxvi, 443.

Eighty-six cases of ovarian tumors in girls 10 years and younger have been reported to date. A large number of these are malignant. Downes thinks they are frequently overlooked. He reports the successful removal of a simple cyst containing 2.5 liters of fluid from an infant 7½ months of age in whom the condition had been mistaken for Hirschsprung's disease.   R. E. WOBUS.

Harley: A Case of Ovarian Cyst of Unique Dimensions. Indian Medical Gazette, 1921, lvi, 18.

Harley reports a case of ovarian cyst in a Hindu coolie, age 40, who gave a history of a small swelling in the lower abdomen gradually increasing in size for fifteen years. Her menstruation was regular up to four months before seen. Slight dyspnea; heart displaced upward; slight edema of legs. Abdomen very large, skin stretched and thin, with veins in it very prominent. No distress on lying down. Circumference of abdomen 73 inches. Urine normal and digestion good. Weight 246 lbs.

She was operated on; an incision was made 30 inches long. The cyst was found adherent to the parietal peritoneum, bowels, diaphragm and liver. The round ligament was the size of a loop of small bowel. The sac was isolated after considerable difficulty with very little bleeding and the patient seemed to stand operation very well. Weight of patient after operation 82 lbs. She died next day of shock due, apparently, to too much handling of peritoneum.   F. J. SOUBA.

J. Mason Hundley and Jack M. Hundley: A Report of Two Ovarian Cysts. Official Publication of the University of Maryland. Bulletin of the School of Medicine, 1921, v, 182.

These cases are especially interesting because of the size of the cysts. In the first patient, a colored woman of 54 years, a cystadenoma of right ovary was found which weighed 102 pounds. During the removal of the cyst one hundred pints of a greenish colored fluid were emptied. The patient convalesced rapidly and left the hospital 14 days after the operation.

The second case was a dermoid cyst weighing seventeen and one-half ounces occurring in a colored child eighteen months of age. The child made an uneventful recovery following operation.

NORMAN F. MILLER.

Book Reviews

The Endocrines.—By SAMUEL WYLLIS BANDLER, A.B., M.D., F.A.C.S., Professor of Gynecology in the New York Post-Graduate Medical School and Hospital. Philadelphia, W. B. Saunders Company, 1920.

The aim of the work as stated in the preface is to present the basic principles of endocrinology together with their application to practical problems that confront the physician. His theory, he states, is mainly derived from clinical observation and the record of an experience with gland therapy over a period of twenty-two years. The scope of the book is considerable, inasmuch as the author believes that heredity, development, normal function of the nervous system and mind are all intimately dependent on the ductless glands.

At the present moment when facts concerning the endocrines have accumulated to such an extent that but few can be sufficiently acquainted with them to discover their applicability in practice, a working theory that is carefully founded would be acceptable even if it cannot be more than provisional. A. Biedl has done much in the matter of sifting the existing experimental data on animals critically in his careful work on internal secretions. A number of other investigators have added to these efforts. But of clinical studies and observations in the human subject, carried out in a painstaking manner, recorded in detail and accurately tabulated, there is a great dearth. Any contribution in this direction therefore must be worth while. When Bandler says in his book ''these opinions are offered on the basis of therapy fortified by clinical observations,'' or again ''if you have a theory and it works out in practice, the chances are that it is correctly founded,'' the hope is awakened that a series of therapeutic tests with organic extracts carefully arranged and reviewed, is to be presented by the author, but in this one is greatly disappointed.

Dr. Bandler's book, while it aims to focus attention on gland treatment, if taken literally, gives a very much exaggerated idea of the scope and value of this form of therapy. Probably this is due to the fact that a larger part of the subject matter is taken directly from the lecture room where the personality of the teacher is known and due allowance could be made for attempts to impress certain points or hold the attention of the hearer. The following extracts will serve to elucidate my meaning.

Pages 393-394. ''She had a fibromyomatous uterus containing five or six separate fibroids, reaching to the umbilicus—reaching way over the pelvic brim so that I could not get my finger between it and the pelvis.'' * * * ''so we gave her 7 grains of mammary extract, and a grain or two of the anterior lobe of the pituitary, —and after six months there was not a nodule in that uterus as large as my fist. That is not only one experience; I have had many such.'' * * * ''I am telling you what gland extracts will do, and you can use them in cases where you don't want to operate, * * * and if you give these medicines for three or four months you may often have a uterus one-third as large as it was, even in that short time.'' It need hardly be commented that no one who claims to teach gynecology should make such a statement as this without being in a position to submit the most painstaking clinical records to substantiate it.

Page 336. ''Exophthalmos is, in my opinion, an evidence of overactivity of the posterior pituitary.''

Page 383. ''Many of my pregnant patients have a transient glycosuria which disappears, and I have considered most of them as pituitary in nature.''

Page 321. ''Whether this overactivity of the pituitary has anything to do with gallstones, I do not know. I believe this to be the case. We do however, observe frequent association between fibromyomata of the uterus, the postpartum period, and stones in the gall bladder.'' All these statements in reference to increased pituitary function strangely enough remain unaccompanied by the results of exact laboratory tests to prove that a hyperactivity really exists in a given case; the sugar tolerance test, for instance, is not even mentioned.

In characterizing individual glands the anterior lobe of the pituitary and adrenal cortex are designated as essentially male glands showing a preponderating development and influence in the male in conjunction with the secretory tissue of the testes; while the pituitary posterior lobe and the thyroid on the other hand are assumed to play a larger rôle in the female. Where a few other authors have in fact held that there is a close relationship between the adrenals and certain emotions as fear and anger, Bandler goes much further in accrediting the one emotion to the medulla, and the other to the influence of the cortical portion of this gland. There are no comparative anatomic and histologic studies cited in the text to prove that actual and measurable differences exist in these glands between the male and female.

In reference to pregnancy the author says ''I have frequently noted that many patients who are not nauseated are quite drowsy and sleepy. I am accustomed to tell such sleepy patients that this is a favorable sign as nausea is not a probable annoyance from which they will suffer.'' * * * He also states ''women whose menstruation occurs at thirty-five day intervals are in need of endocrine stimulation, they are more likely to begin labor at a date later than estimated.'' How helpful it would be if Bandler proved this to be correct.

On page 331, the symptoms and signs suggestive of endocrinal disturbance are grouped to help in clinical observation; but in order to safeguard against error in their interpretation, those which have been thoroughly established should be treated separately from those which are not.

Of the cases (pages 397 to 475) finally cited to furnish the basis for the author's conclusions, a considerable number must be eliminated as inconclusive because the period of observation is too short, less than three months, and often only several weeks. In a second group, definite conclusions cannot be drawn about any particular preparation because a number of substances are administered at the same time and the therapy is frequently changed. In a third group the exact duration of treatment is indefinite or not mentioned; neither is any allowance made throughout for the numerous sources of error in interpreting a patient's report.

Generally speaking the book is original in the manner in which the subject is dealt with, and may even help to stimulate observation along certain lines, but, unfortunately the author often expresses himself with a finality which is certainly not justified by the data which he submits; and, coming as they do from a teacher in gynecology, some of his assertions may be distinctly misleading.

FREDERICK E. NEEF, M.D.

Extrauterine Pregnancy.—By EDWARD A. SCHUMANN, M.D., Lecturer on Obstetrics, Jefferson Medical College; Gynecologist and Obstetrician to the Philadelphia General Hospital, etc. With 71 illustrations. Gynecological and Obstetrical Monographs. D. Appleton and Co., New York and London, 1921.

It was a pleasure to read this book and it is a privilege to recommend it to others. Authors of monographs have this advantage over textbook writers that they need not anxiously consider the available space. Schumann, however, has not abused

his opportunities; nowhere in this attractive volume of 189 pages does he appear
verbose or use "padding" to fill his pages. On the contrary, the book contains a
wealth of material from the author's own studies and careful observations, and from
judicious reading of the literature. That he pays particular attention to American
views (as stated in the preface) and leaves aside some of the more recent contribu-
tions from England, France, and Germany, may, at first sight, give the impression
of a somewhat narrow nationalism in medicine; but, on second thought, the funda-
mental ideas on so important a question as ectopic pregnancy, have so frequently
been exchanged between the various nations, that it makes little difference which
literature is consulted. And it may further be said that this book not only contains
all that is of consequence, but that it presents the subject in so clear and fluent a
language that the attention of the reader is held from the beginning to the end.

Of the rich contents, only a few points can be mentioned—enough, however, to
indicate how valuable this monograph will be to anyone who wishes to familiarize
himself thoroughly with the subject.

The opening chapter on the history of extrauterine pregnancy leads the student
from the first recorded case about the middle of the eleventh century to the incep-
tion of modern methods of treatment and gives an excellent exposé of the gradual
growth of understanding of the gravity of the condition and the development of
means to combat it properly. The history of medicine is interesting at all times,
and this fascinating chapter is exceptionally well told. (The reviewer would interpo-
late here that Abraham Cyprianus, in 1694, in operating for tubal pregnancy, was
the first to make use of what is now called the Trendelenburg position so as to pre-
vent the extrusion of intestines.)

The second chapter deals with the frequency and causes of ectopic gestation.
Schumann found that in Philadelphia, in 1918, there was one extrauterine to 303
intrauterine pregnancies—a marked increase of the former which is partly fictitious
as it is due to improved diagnosis; but there is also an actual increase because, "as
conservative gynecologic operations become more popular, so will subsequent ectopic
gestations become more common, since previous pelvic operation is so usual an event
in the history of these cases." Among the various causes, obstruction of the tubal
lumen from within seems to underlie the vast majority of all tubal pregnancies. It
does not occur in the presence of acute or subacute salpingitis but it does take
place when the inflammatory process is subsiding, "and it is fair to assume that,
had the ectopic pregnancy not developed at this time, the tube would probably have
become completely healed within a few years, thus permitting the fertilized ovum to
reach the uterus."

In Chapter III, dealing with the termination of extrauterine pregnancy, the
author is of the opinion that the ovum is absorbed much more frequently than is
commonly believed. As to other modes of termination, rupture occurs with nearly
double the frequency of tubal abortion.

The Anatomy and Pathology in Chapter IV has been of particular interest to the
reviewer. The various theories regarding the implantation of the ovum in the tube
are here discussed in full. Conclusions based on animal experiments are valueless,
says the author, as no true case of tubal pregnancy has ever been found in the lower
animals. The description of the histologic changes in the affected tube is well sup-
ported by good drawings of which the entire book abounds. The valuable work of
Sampson is fully considered in this chapter. The author observed three cases of
interstitial pregnancy in one of which the unusual evacuation of the fetus through
the uterine cavity took place. True ovarian pregnancy, according to Schumann, is
not as excessively rare as has been thought in the past; these cases probably ter-
minate early and are dismissed with the diagnosis of ovarian hematoma after a
cursory microscopic examination.

The following chapter on recurrent extrauterine pregnancy gives due prominence to the important studies of Richard R. Smith and others. The author rejects the proposition to uniformly remove the nonpregnant tube as a routine procedure in operating for tubal pregnancy.

The chapter on diagnosis and symptomatology is admirable and deserves to be read with the utmost concentration. It dispels the myth still current among practitioners that tubal gestation can never be diagnosed before rupture, though occasionally the correct differentiation from other conditions may meet with difficulties.

In the final chapter, the author presents his personal attitude regarding treatment and submits his management of the various phases of the condition. In a general way it may be said that Schumann sees in shock from intraabdominal hemorrhage no contraindication to immediate operation and warns against Robb's teaching to wait until reaction has occurred. Prompt abdominal intervention in any stage of the disease is the keynote of the author's attitude, and one is reminded of the famous dictum by Werth, in 1887, that ectopic pregnancy must be considered as a malignant new growth which should be attacked without delay whenever and wherever it is encountered. The vast improvement in results as expressed by accurate statistics fully justifies such prompt action; and this review cannot be better concluded than by quoting the author's own closing paragraph: ''It has been said in high places that there is no excuse for the existence of gynecology as a surgical specialty, but to him who has read this book, the question is left, as to whether or not a branch of medicine which has within a half century reduced the mortality of so dreadful an accident as the rupture of a gravid tube, from 80 per cent to 4 per cent, has not justified its existence in full.''

GEORGE GELLHORN.

Menstruation and Its Disorders.—By EMIL NOVAK, A.B., M.D., F.A. C. S., Instructor in Gynecology, Johns Hopkins University, Baltimore. Obstetrical and Gynecological Monographs. With 40 illustrations. D. Appleton and Company, New York and London, 1921.

This interesting book which constitutes the introductory volume to a recent series of specialists' monographs is devoted to all phases of the subject, both normal and abnormal. At the same time the effort has been made to give a practical aspect to the volume so that it will be of interest and value to the practitioner. For this reason the surgical treatment of the various forms of pelvic disorders which are associated with disturbances of menstruation, has not been considered, for, as the author wisely states, this would mean the inclusion of a treatise on operative gynecology. A great deal has been learned about the nature and mechanism of the menstrual phenomenon during the last two decades and this knowledge is an important factor in the more intelligent treatment of the disorders of menstruation which constitute a considerable portion of the ailments to which women are subject. The histology of the endometrium as developed particularly by Hitschmann and Adler has revolutionized our former ideas and this has had its effect on treatment in so far that unrestrained resort to the curette in all menstrual disorders had been greatly reduced. The close relation which has been found to exist between the pelvic organs and the endocrine system has led to the opening of an entirely new field of research which, however, is still in the uncertain and formative stage. Not only the ovary but the thyroid, pituitary, suprarenal, thymus and mammary glands have been drawn into the discussion of menstrual physiology and pathology. Organotherapy has been developed to such an extent in the treatment of menstrual disturbances and the results have occasionally been so brilliant that

disappointment must naturally result from the indiscriminate employment of the endocrine substances. The author wisely cautions against such indiscriminate drugging and shows that we are still in the speculative and experimental stage of the subject.

The chapter on the treatment of menstrual disorders by radium and x-ray has been contributed by Drs. Kelly and Burnham who have done so much work in this field that their statements may be accepted with authority. Undoubtedly the benefits derived from the use of radium in menorrhagia are of great value and importance.

Dr. Novak's book constitutes as far as we know the only contribution to this important subject in the English language and is therefore deserving of attention by the profession. No doubt it will be widely read and deserves to be favorably commented upon.

The Difficulties and Dangers of Obstetric Practice.—By COMYNS BERKELEY, M.A., M.D., M.C., Cantab., F.R.C.P., Lond., M.R.C.S., Eng., and Victor Bonney, M.S., M.D., B.Sc., Lond., F.R.C.S., Eng., M.R.C.P., Lond. Third edition. With 309 illustrations. P. Blakiston's Son & Co., Philadelphia, 1921.

This popular book has undergone its third revision within a comparatively few years, which bespeaks its popularity. A chapter on the feeding of infants has now been added, though one may wonder what this subject has to do with the "difficulties and emergencies of obstetric practice." The authors consider in a satisfactory manner the usual disorders of pregnancy and follow this up with detailed accounts of labor and its complications, together with the ordinary and extraordinary obstetric operations. The book is very satisfactorily illustrated and this is a feature which adds much to its value, especially in the differential diagnosis of a variety of conditions. In commenting on the illustrations, one cannot but express some doubt, however, as to the possibility of the gymnastic performance shown in Fig. 2, which is the position favored by the authors for bimanual examination but which must be distressing to the patient. The book contains a wealth of material and affords an excellent résumé of the differential diagnosis of the treatment of a large variety of obstetric conditions. It may be of interest to refer specifically to certain methods of treatment advocated by the authors. In inevitable miscarriage there is recommended after dilatation with graduated sounds and removal of the uterine contents, the administration of an intrauterine douche of 1-4000 bichloride (?) at a temperature of 115°F. followed by uterine packing if there is bleeding; otherwise by vaginal tamponade. It has been amply proved that intrauterine douching is a source of danger because the fluid may find its way through the fallopian tubes into the general peritoneal cavity. In addition the intrauterine pack is usually employed in order to avoid undue hemorrhage even if none is present at the time of operation; whereas the vaginal pack merely obscures the symptoms of the same. Although the authors do not advise the curette in cases of sepsis complicating abortion, the restrictions might with advantage have been made somewhat stronger. In the treatment of bleeding from placenta previa, vaginal packing is also recommended as a temporary expedient but the extraovular insertion of the dilating bag is not advised, contrary to the favorable experiences reported within recent years by several American observers. In postpartum hemorrhage the routine use of ergotin or pituitrin is favored but pituitrin as a prophylactic before delivery of the placenta is not referred to except in cases where there is a history of previous bleeding, when they recommend that

ergotin or pituitrin be given just as the head is being "crowned." It seems to us that this is rather a doubtful and dangerous recommendation.

The chapter on puerperal fever is very complete and the treatment quite radical. Digital exploration is recommended in most cases while the dangers of the curette are amply discussed. The intrauterine douching is not advocated as freely by the authors as in their treatment of abortion. In the discussion of anesthesia during labor preference is given to chloroform. The personal observations made by one of the authors on 200 cases of twilight sleep seem to make him rather doubtful of its value, as labor was prolonged, the use of forceps more often necessary, the percentage of uterine rupture higher and the failure of occiput posterior positions to rotate normally was commoner. The necessity of very careful personal observation of the patient is insisted on.

The chapter on obstetric operations is very complete and the descriptions of the various forceps operations most satisfactory. The authors seem to favor the axis traction instrument in most of the cases. Notwithstanding the fact that the left lateral position for forceps delivery is so commonly employed in England, the authors favor the lithotomy posture.

In discussing cesarean sections the preference is shown for the classic operation with the incision in the midline below the umbilicus and the uterus is not eventrated. For sewing up the uterine wall a form of mattress suture is recommended. Among extraperitoneal operations the authors limit themselves to the descriptions of Sellheim and Latzko's methods as being the most suitable.

One is rather surprised to find that the important subject of the toxemias of pregnancy is included in a chapter labelled "disorders of the urinary tract." The description of this important complication of pregnancy might well have been extended. References to the conservative methods that are meeting with increased favor are not sufficiently elaborated and the surgical methods of delivery are apparently given the preference. Eclampsia is not a disorder of the urinary tract although albuminuria may be the chief symptom in a preponderic number of cases but the inclusion of the description under this heading affords a mistaken idea as to the underlying etiologic factors.

Book Notices

Acknowledgment is made of the receipt of the following books, selected reviews of which will appear in early numbers.

DAS PROBLEM DER FRUCHTABTREIBUNG VOM ÄRZTLICHEN UND LEGISLATIVEN STANDPUNKT. By Dr. med. Franz Kisch. Berlin, 1921, Urban and Schwarzenberg.

DIE PROPHYLAXE UND THERAPIE DER ENTEROPTOSE. By Prof. Dr. Ludwig Knapp, Berlin, 1921, Urban and Schwarzenberg.

DÖDERLEIN-KRONIG OPERATIVE GYNÄKOLOGIE. Fourth Edition. Revised by Dr. Albert Döderlein. With 455 Illustrations. Leipzig, 1921, Georg Thieme.

Correspondence

To the Editor,

    American Journal of Obstetrics and Gynecology.

Sir:

I beg to call the attention of the profession to a method of attacking the problem of the cystocele and to suggest the employment of the subjoined technic to those who may be interested. It requires a fairly long series of cases before any definite conclusions may be reached, and it is my hope that with more operators interested the series of cases will increase rapidly.

The technic proposed is as follows:

1. Operation only to be attempted in cases where laparotomy is indicated.

2. No vaginal work on cystocele.

3. Low abdominal incision, Pfannenstiel or median.

4. Uterus pushed into retroversion.

5. Bladder fold of peritoneum separated from anterior uterine wall as in ordinary hysterectomy.

6. Bladder pushed off uterus by gauze aided by separation of fibrous attachment with scissors.

7. When lower edge of bladder attachment is reached, the separation is to be continued along the anterior vaginal wall, until the entire bladder is free to the urethra (almost) and laterally to the margin of the broad ligaments.

8. Bladder held forward against symphysis by a Deaver retractor and the pillars and torn fascia of the anterior vaginal wall sutured to the fascia along the rami of the pubes exactly as in vaginal procedures save that the mucosa is intact.

9. The cystocele having been obliterated the bladder is sutured to the anterior uterine wall by a few interrupted sutures of fine catgut, the bladder being fastened slightly higher on the uterus than before.

10. Uterus elevated by any standard procedure.

11. Abdomen closed.

On inspecting the cystocele from the vaginal side the mucosa will be seen to be thrown into a series of deep longitudinal folds. These smooth out and disappear within six months. The operation has been done by me for about one year with apparently good results so far.

                                    Edward A. Schumann.

Original Communications

THE FADS AND FANCIES OF OBSTETRICS. A COMMENT ON THE PSEUDOSCIENTIFIC TREND OF MODERN OBSTETRICS*

By Rudolph W. Holmes, M.D., F.A.C.S., Chicago, Ill.

IT IS useful, now and then, to look backward, for an occasion may arise when necessity will demand that we shall retrace our steps, or at least that we may measure our progress. Without retrospect we may lose the proportion of things and awake to the fact that we have made no advance, in fact have merely run around a vicious circle. We all know how phenomenal have been the advances in obstetrics in many particulars; untold benefits have come from the introduction of anesthesia and asepsis which have made possible many operative procedures which were the dream of the obstetricians of the past. Under the new regime the indications, at first, were clearly and definitely drawn; as the certitude of the freedom from pain from anesthesia and the proximate eradication of sepsis were realized, indications were placed on a broader basis, until they became so loosely laid down that they had no real justification beyond what the operator determined for himself. It is not far from the fact that obstetrics, today, is in identically the position that oöphorectomy held some twenty-five years ago. The indiscriminate employment of operative intervention in obstetrics has accomplished little in the way of conservation of life of the mother and child; in fact, as I see it, conservation of life is not to be realized

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*Read at the Forty-sixth Annual Meeting of the American Gynecological Society, Swampscott, Mass., June 2-4, 1921.

Note: The Editor accepts no responsibility for the views and statements of authors as published in their ''Original Communications.''

The papers included in the Transactions of the American Gynecological Society are printed in the order of their presentation.

by operation beyond the exactness in determining its justification, and its correct use. If figures may be interpreted to mean anything I believe my data prove conclusively that our endeavors during these later years have been misspent: true conservation is to come from intelligent, scientific investigation of the pathology which underlies and is responsible for so much of our disease in the pregnant and the unborn child. A ruthless operative course in all parturient women is not the solution, for many of the troubles which come to women and the baby are directly incident to the hazards of birth and these are augmented by unwise interference.

We all know how wonderful has been the diminution of the mortality rates for women and infants in private practice: however, the safeguards placed about the mother have accomplished more than they have for her offspring. How many of you know that the death rate for women, in hospitals, is as great today as it was a hundred years ago—the decrease being so negligible that one hardly would know it? How many know that in hospitals the fetal death rate is essentially what it was one century ago? These startling findings are the excuse for presenting this paper. It is my purpose to attempt an analysis of the conditions, to give a tentative explanation and to open the trail so that others may pave the way, so that obstetrics may be a scientific specialty, not a makeshift as it is now.

Is it not seemly that we should take cognizance of conditions obtaining, when this country of ours is fourteenth in the list of civilized countries having statistics dealing with the mortality of the new mother? Is it not seemly that we should consider this matter when 8453 women died, according to mortality statistics, in 1910? To be sure cancer kills 9,857 women, but cancer takes its toll at 58.4 years on the average, while child-bearing takes the young woman in the fullness of life at the age of 29.8 years. Does it imply that neither the public nor medical profession has fully appreciated the benefits of prophylactic medicine? Or is it that scientific pursuit has not yet solved the problem, and we are still groping in the dark!

The masters of the century ending with the beginning of the antiseptic era had developed the art of obstetrics (in contradistinction to the surgery of obstetrics) to a high degree: the skill with which they were able to deliver women in the presence of all sorts and conditions of complications developed a nicety of technic which left little or nothing for the modern authority to improve: in fact very little has been contributed these forty years on the art of obstetrics. The old masters, in spite of the restrictions imposed by the risks of infection, and therefore, lacking an opportunity of developing a technic from practice, were able to conceive the essential principles of the mutilat-

Table I

Maternal and Fetal Mortalities

References	Period	Total No.	Mothers Died	%	Abor- tions	Still- born	%	Child Died	%	Died 14 Days	%	Died Total	%
Clarke: Collins'	1782	17650								2944	17.		
Mid., p. 514, 1835	1784	8033								3419	5.2		
Ramsbotham: Mur-	22 yrs.	48996	220	.44			5.4	2723	5.5				
phy's Mid., 1862	1856	6634	65	.92				467	7.03				
Hardy & M'Clintock:	1861	13748	163	1.18		b130		968	7.04				
ibid., p. 698		22243						837	3.7				
Sinclair and Johnson: ibid.								c967	4.3				
LaChapelle: ibid., p. 699.								d244	3.7				
Arneth: ibid, p. 700	1847	6527	127	1.9		10184	5.4	9670	3.59	1610	6.05	17851	9.6
Dublin Lying-	1747	182997	2352	1.28									
in: ibid,	1861	e185737											
Kőrősi: Ashby and Wright:	1875	26623				7653	3.2						
Dis. Child. p. 13, 1893													
Schultze: Winckel	1893	236050											
Handb., Bd. 2, Th. 3	1902												
p. 1706.													
Annual Report,	1890	10233	42	.41	417	359	3.65	171	3.4	214	2.18	573	5.8
N. Y. Lying-in, p. 79, 1897	1896	f9846	50	.96	226	271	5.4					442	8.8
Bulletin: ibid., p. 27, June, 1911	1910	g54165 f5962			215	262	4.59	165	2.89			427	7.86
Ibid, p. 56, March, 1913.	1912	g54606 f5412	57	1.01	237	255	4.07	155	2.17			410	6.6
Ibid, Jan. 1917	1915 1916	g64266 f64100	50	.8									
Cragin: Prac. Obs.	1908	10000				499	4.5	389	3.9	89	2.63	838	8.5
1915, p. 836	1913	f9767			231	94	2.77					183	5.4
Edwards: J. A. M. A.	1907				32								
Oct. 16, 1915	1914												
Williams: Ibid., Jan. 9, 1915	1876	10000				h716	6.79			705	7.05	705	7.05
Moran: Ibid.,	1915	10533				h358				623	5.9	981	9.5
Dec. 25, 1915.													
Augustana Hos.	1911	g49964	15	.76		57	2.8			82	4.6	139	7.03
Chicago.	1920	i1975											

ABOVE FIGURES ARE SUGGESTIVE: DOES MODERN LIVING ENHANCE RISKS OF CHILDBIRTH? WHAT INFLUENCE DOES THE ARGUMENT HAVE THAT MORE SERIOUS CASES ARE ADMITTED TO HOSPITALS OVER FORMER PERIODS? THE N. Y. LYING-IN HAS ABOUT 10% OF EMERGENCY WORK. Abortions are excluded in getting percentages of stillbirths and children that died as abortions are as yet not preventable. KEY: a. After ventilation introduced: b. premature and deformed: c. total deaths: d. includes feti dying within 9 days: e. total children includes twins, etc.: f. abortions deducted: g. mothers: h. Moran did not separate abortions from stillbirths: one half taken as rough estimate as stillbirths: i. twins: included. "Children died" may include stillbirths and those dying in the hospital—no explanation thereon given. Williams' figures comprise stillbirths and those dying in 14 days.

ing operations on the mother—which now more euphoneously are de-
nominated obstetric surgery.

The fact that modern maternity hospitals, where is centered the ob-
stetric skill and knowledge of our profession, have been unable to
decrease the dangers of birth to mother and child over the figures
obtaining the early part of the nineteenth century is *prima facia* evi-
dence that modern obstetric surgery is ineffectual in combating those
dangers. Table I has been prepared to demonstrate this contention.
The fluctuations in the maternal death rates, before 1880, ranged from
0.44 to 1.28 per cent, and are only variants which would come to any
institution from year to year. Since 1910 the rate varied from 0.41 to
1.01 per cent in different institutions. An analysis of the children was
not so graphic in view of the fact that some writers, as Moran, combined
abortions and stillbirths, others included stillbirths and those dying in
the hospital. Still, the figures show how little progress has been made
these many years. There are many arguments which might be ad-
vanced to show why present hospital statistics are not comparable to
those of olden times—the main one being that *now* it is customary to
send women with complicated labors to an institution which largely,
in the former period, were treated at home. Harrar[10] shows this graph-
ically in his report on the deaths in the New York Lying-in. How
much is offset by the tendency to treat those complications by surgery
rather than by obstetric methods is debatable.

Two complications of pregnancy may be briefly discussed to show
how negligible has been the advance in recent methods of treatment.
Eclampsia stands out preeminently as a complication which demanded
some method of delivery ever since Blundell,[1] in 1834, discussed the
advisability of acceleration of delivery, and Carl Braun[9] popularized
it. During last twenty years various obstetricians have improvised opera-
tive measures which might accomplish the result with a minimal lapse
of time. More discussion has been employed on how to empty the
uterus in eclampsia than has been expended on all other phases of
the problem. The most evident thing about the question is the paucity
of evidence adduced which might elucidate the cause, and then develop
a rational therapy. Surgery for eclampsia as the essential part of the
treatment is clearly and definitely indefensible. If there be anything
to Stroganoff's treatment, it shows most positively that eclampsia is
a disease, as popularly treated, which carries a dual mortality—that
incident to the toxemia and an equal hazard from the surgical inter-
vention. In Table III, I show that in the preantiseptic days the ma-
ternal and fetal mortalities were respectively 20.4 and 33.3 per cent;
the modern methods exhibited mortalities of 19 and 39.6 per cent;
while in cesarean section in the period covered by modern treatment,
the deaths were 34.8 and 25.9 per cent, respectively. Our modern con-

ception of the treatment considers many things other than prompt delivery: really, it was not until 1850 that remedial agents were advocated other than blood letting, and purging. Blundell[1] did discuss, as did others, the use of opium, but many years elapsed before sedatives, anesthetics, etc., became established adjuvants to the therapy. It may be said that the older authorities had no real therapy, yet their results were as good, even better, than ours. In other words, no modern therapy has modified the lethal progress of mother and child with the single exception of that of Stroganoff: a comparison between the results of the latter with the much lauded cesarean operation shows that approximately one baby is saved at the expense of nearly four mothers. I believe Peterson did an unwise thing in his cesarean-eclampsia papers when he attempted to show how many babies might be saved by the operation, and not showing how many were destroyed by the disease; there is a great difference. Eclampsia always has been a fulminating, acute, malady with a high death rate: the operative measures so popularized are carried out on bad surgical risks. Anuria, bowel stasis, anhidrosis, with marked cerebrospinal manifestations, characterize the disease and, as a result, women have died from the toxemia and the operation: likewise, the infants succumbed to the intoxication and the hazards of a forced delivery. Newell[2] has given ample evidence of the pernicious influence of the teaching that eclampsia demands major surgery.

Mueller[3] stated that one half of the deaths from placenta previa were due to infection. The mortality of the mother has decreased one half by cleanliness, not from an improvement of technic, or startling innovation in treatment. Obstetric treatment has not affected the fetal mortality whatsoever, though cesarean section has reduced the percentage from 55.5 to 35.6. Again, the section has not diminished the maternal mortality over approved obstetric methods and, comparing the results of the average cesarean mortality with the findings of such experts as Stratz,[4] Welti-Pinard,[5] and Koblanek,[6] who demonstrate the gifts of skill, we still find that the section kills women in order that babies may be born alive. A priori, it would seem that a previa should only be handled by surgery when the woman is a good surgical risk, free from possible contamination, at or near term, the baby definitely alive, and some valid contributory necessity such as a minor pelvic deformity. The advocacy of a routine cesarean for all previas will bring upon the public malign results similar to those depicted by Newell for eclampsia.

I think the facts I have outlined for those two great obstetric complications are sufficiently alarming to warrant your attention. If a comprehensive comparative study were extended to cover a multitude of ordinary accidents of childbirth I am sure data would be presented

which would still further substantiate the general principles I have deduced, namely, that modern obstetrics has not safeguarded child-bearing logically as it should be.

The commonly accepted explanation for the maternal and fetal mortalities as they obtain today is given succinctly in the *Journal of the American Medical Association*.[7] "Two causes are suggested: ignorance on the part of the public of the dangers connected with childbirth and of the need of skilled care and proper hygiene to prevent them, and the difficulty of securing proper obstetric care * * * and the public still regards childbirth as an entirely normal process and a certain number of deaths are unavoidable. This has reacted on the medical profession, producing low fees, so that, with the exception of the city specialist, obstetrics has become the worst paid, although the most difficult and exacting branch of medicine."

TABLE II

Obstetric Results of Midwives and Physicians of Newark Compared*

	MID-WIVES	PHYSI-CIANS	HOSPI-TALS	CITY RATE
Proportions Confined	49%	39%	12%	
Puerperal deaths	10	31*		
Puerperal deaths, women having been given antenatal care, No. 586.	.17%			2.02
Children dying under 1 year of age—2 year period, per cent	7.07%	7.43%	9.74%	9.74
Children dying under 1 mo.—2 year period, per cent	2.51%	3.82%	5.73%	
Stillbirths in women receiving antenatal care	.68%			4.17%

SPECIAL THERAPEUTIC MEASURES	MOTHERS DIED	STILL-BIRTHS	DIED IN 14 DAYS	TOTAL
Midwifery data brought down.	.17	.68	2.51†	3.19
Routine Version: Cases 1113 (Ia)	.179	3.7	3.05	6.7
Routine Version: Cases 200 (Ia)	1.5	9.5	6.5	16.
Routine Dilatation by bags: Cases 200 (Ib)	1.	1.	5.	6.

*Levy, Julius: Am. Jour. Obst., Jan. 1918, p. 41.
Routine version: Am. Jour. Obs. and Gyn., Mar., 1921.
Routine version: Ibid.
Routine dilatation by bags: Ibid., Oct., 1920.
†30 days.

No one may refute the correctness of the views here quoted in so far as they go, but many other factors have their determining influence. Ignorance and credulity as regards medical matters are dominating characteristics of the lay mind, but just these elements are clay to be moulded by altruistic physicians in educating the public. Patent medicines and spurious medical cults have their success assured by playing upon these weaknesses of the public. The public wants something better: the public may believe now and then death awaits at the door of the confinement room, but it wants that incidental demise to occur elsewhere than in its own home: if the public knew

the solution it certainly would have it to ward off the evil. The crux of the problem lies within the education of the profession and there is no need of an endeavor to place the onus upon the ignorant public.

The rise and fall of the efficiency in judgment of the general practitioners in their obstetric work are reflections of the attitude and efficiency of the obstetric teachers: and by teachers I mean not only pedagogic members of college faculties, but also contributors to current medical literature. The former and the latter may be one, but from the fact that one may be a professor in an approved medical school gives added dignity and weight to his utterances, and therefore, will be more dangerous from that fact if his teaching be faulty. With a few possible exceptions, probably the quality of the teaching of our colleges is as defective as Williams[5] found it some years ago. A few maternities have expanded since Williams prepared his paper: largely, they are still inadequately equipped, with insufficient capacity for proper teaching, or for developing the clinic experience of the teachers themselves. What may one expect of the average teaching force other than it will give inadequate and faulty instruction: that its mediocrity in experience and capabilities will be reflected in the mediocrity of thought and attainment and ability on the part of the students faultily trained. Too often teachers do not instill into their students the breath of conservatism, of sound thinking, of deductive reasoning, so later, as physicians, they grasp at the most nonsensical recommendations. We all can recall our student days when the professor who gave spectacular clinics was more popular than he who conducted his clinic without ostentation: in many of our principal colleges the obstetric clinic of the present is too largely the pyrotechnic exhibition which characterized the older surgical arena. An aggregation of complex, unusual problems are presented, leaving scant time for the ordinary run of obstetrics, such as will be indispensable to the student as a practitioner. Certainly a clinic which gives a student 18 major obstetric operations in his two weeks' practical training has misappropriated the student's time. The modern trend in obstetric teaching interferes with a student's perspective: a student who sees an array of heroic surgery out of all proportion to his practical clinic and didactic work, is so befuddled that he naturally conceives that nearly all cases need intervention. Then again, the student's perspicacity may discern that the professor's indications are weak—but later, as a physician, he will do likewise, backed by eminent authority.

The contributions to the literature are the postgraduate instruction of men in active practice. The authors are the bell-wethers of those who read and learn: these writings may be the guides to the thoughtful to a better understanding, and to a more perfect solution of the difficulties which constantly arise in practice or they may be merely

TABLE III

Eclampsia Mortalities

REFERENCES	PERIOD	NO. MOTHERS	DIED	%	NO. CHILD	DIED	%
Ramsbotham: Murphy Mid.	1840	43	3	6.9	53	18	33.9
Collins, R.: 1862 p. 698.	1835	30	5	16.6	32	18	56.2
Hardy and M'Clintock: Ibid.	1857	13	3	23.	13	6	46.1
Sinclair and Johnson: Ibid.	1847	63	13	20.6	69	23	33.3
Mme. LaChapelle: Ibid.	1821	8	?	?	8	2	25.
Arneth: Ibid.	1849	13	4	30.7	13	6	46.1
Braun, C.: Gyne., p. 833, 1881.	1878	73	20	26.	73	15	20.5
Totals: Before antiseptic era.		235	48	20.4	261	88	33.3
Modified Expectant Methods							
Dührssen: Eclampsia; Winckel's Handb. d. Geb., ii Tl. 3.		80	30	37.5	80	60	75.
Friedman, B.: Ibid., p. 2411.							
Goedecke: Ibid., p. 2412.		403	69	17.1	403	194	48.
Franz: Ibid., p. 2421.		17	2	11.8	17	5	29.4
Sommer: Ibid., p. 2421.		16	6	37.5	16	10	62.5
Jardine: Ibid., p. 2423.		22	6	27.7	23	13	56.3
Sturmer: Ibid., p. 2423.		43	5	12.2	?	?	
Mangiagalli: Ibid., p. 2423.		18	1	5.5	?	?	
Stroganoff: Ctb. f. Gyn., 1910, p. 756.		400	26	6.6	360	77	21.6
Lichtenstein: Arch. f. Gyn., 1911, p. 183.		400	74	18.5	371	144	38.8
Hammerschlag: Op. Gyn., p. 433.		8	3	39.	?	?	
From R. Peterson, Am. Jour. Obst., 1911, lxiv, p. 1.							
Bumm-Liepman: Ibid.		90	28	31.1			
Esch (1904-5): Ibid.		79	20	28.8			
Esch (1905-6): Ibid.		145	42	28.9			
Glocker: Ibid.		9	3	33.3			
Möhlmann: Ibid.		10	1	10.			
Winter: Ibid.		8	3	37.5			
Zweifel: Ibid.		49	16	32.6			
Totals: Modified expectant cases.		1795	335	19.	1270	503	39.6
Peterson, R.: Am. Jour. Obst., 1911, lxiv, 9. Vaginal Cesarean.		530	124	23.4	315*	67	21.2
					530†	282	53.3
Peterson, R.: Ibid., 1914, lxix, 924.		500	174	34.8	381*	25	6.5
					481†	125.	25.9
Cases before 1908.		198	95	47.9	133*	16	12.
					198†	81	53.3
Cases after 1908, to 1913.		283	73	25.8	248*	9	3.6
					283†	44	15.5

*Results obtained by eliminating children weighing 2000 gm. or those up to eighth month of pregnancy or that were judged to be premature, living or dead: no child was counted which was known to be dead at time of operation.

†We are dealing with a disease having a high mortality, influenced by various treatments, not the dangers of a major operation: i.e., for the sake of comparison it is necessary to add such figures to the infant mortality as will account for the babies not included in Peterson's statistical report.

Maternal mortality has not been ameliorated these one hundred years. Fetal mortality has not been diminished, either. Cesarean section robs the fetus of many of the lethal stresses of forced delivery, therefore Cesarean section saves babies at the expense of the mother.

the occasions for commercializing the writer, who does not exhibit a celerity of judgment in his recommendations. Unfortunately, too often readers are unable to differentiate between the gold and the dross and as a result any one who will report an operation or a line of

treatment, necessary or unnecessary as it may be, for some ordinary or extraordinary indication, will have imitators who pass the bounds of reason. It may be difficult for the average reader to discriminate between fallacy and truth in the writings of a subtle author: for that reason a man of judgment will not rush to print until long, mature experience justifies the exposition of his theme. There have been too many unwise exploitations which were precipitated upon the profession in the hopes, if they proved popular, priority might be claimed. We all recall the fiasco of twilight sleep furor. We all know the dangerous results which came from the thoughtless laudation of the reputed harmless virtues of pituitrin. The pen is reputed to be mightier than the sword, and it surely is more deadly when wielded by the sophisticated writer.

The basic error has crept into the obstetric field that pregnancy and labor are pathologic entities, that childbearing is a disease, a surgical malady which must be terminated by some spectacular procedure. There is too insistent preachment by those who are defending a reign of terror, of promiscuous operative furor, by the argument that women have so degenerated that childbearing is a phase of pathologic anatomy. These discussions have gone so far that practitioners, supported by spurious authority, are operatively interfering when conditions demand a watchful expectancy, or at most some minor intervention—the culpability lies not with the general practitioners, but their sponsors. And no one is doing so much of this needless operative interference as many of our reputed leaders, and they know not the wreck they have wrought, for they hear only the encomiums on their fallacious representations and their misapplied skill. Those who have stopped, looked, and listened have seen and heard the catastrophies which have accumulated in the wake of the false promulgations. I believe there should be a most emphatic declaration that childbearing is *not* a disease, is a normal physiologic function which may develop pathologic aspects and for that reason all women should have a most careful conscientious prematernal care so they may guard themselves and be protected against possible disaster to themselves and their offspring. The general polemic that labor is a species of the torture of the inquisition has been advanced so frequently that many defend most drastic interferences on the score of saving women this horror—that the dread on the part of women of this frightful agony warrants any and all kinds of expedients to relieve them of the various stages of labor, when, in fact, too often these strictures are merely the shibboleths of those who would operate with little or no provocation. In consequence, we see some who claim the great object is to shorten the first stage by the routine introduction of the bag; another, that it is an obstetric crime to interfere with the delicate mechanism of dilatation, but the moment

dilatation is completed, then, the parturient canal must be slashed, and the baby and placenta delivered by high art. Another holds that the baby must be ushered into the world as custom dictates it shall make its mortal exit—feet first; again, we find men who believe the cesarean operation the panacea for all ills and make it a routine procedure. I have been credibly informed that for a woman to be more than six hours in labor brought censure or reproach upon the physician in attendance, in one of the large towns contiguous to Boston. A former student was showing me through a hospital where he was resident: he informed me he was told, as a joke, that the ''office hours'' was the principal indication for forceps, but when he got on the obstetric service he found it was the plain truth. I have yet to be convinced that the average woman is repressing the reproductive function from the fear of the pangs of labor: the woman who is so loath to assume motherhood on this score probably has such an absence of maternal instinct that her progeny, uncreated, are more happily situated in the *here-to-fore* than made subject to her selfish influence. Those who have studied the situation know full well that sociologic-economic necessity transcends all others in the restriction of families.

In the past, conservative writers arraigned those who did meddlesome midwifery, the vogue of the times being minor transgressions like protracted digital dilatation which accomplished no purpose, titillation of the clitoris for the purpose of exciting pains, or making the hapless woman forget her troubles, pulling on the cord, or too frequent application of the forceps, etc. Meddlesome midwifery has now taken a more serious turn until it comprises all the known methods of necessity, even major surgery, without the vital essence of a valid indication: the favorite rôle being those which will consummate delivery with the minimal expenditure of time. Is it not a parody on modern scientific obstetrics that each advocate of his special form of interference will proclaim results not in consonance with the experience of experts, will declare the simplicity of the procedure is such that all may do it, no untoward effects need be expected, when in our hearts we know their allegations, probably based upon thoughtless enthusiasm, are most egregiously exaggerated? And when these advocates appear before a scientific body, with their spacious claims, all laud their skill, and rarely is one courageous enough to combat the irrational and untenable interference.

It was a natural consequence that all obstetric procedures had their indications widened as their relative safety became established. But that any operation, because asepsis makes it reasonably safe and anesthesia keeps the patient quiet during its performance, should be so inordinately broadened in its scope that the suspicion (no candid admission) is evidenced that it is being done for the convenience and con-

TABLE IV

TREATMENT OF PLACENTA PREVIA
MORTALITIES COMPARED

OBSTETRIC TREATMENT TABULATED BY HOLMES	MOTHERS			CHILDREN		
	NO.	DIED	%	NO.	DIED	%
Ramsbotham*	82	?	?	82	50	60.9
Collins*	11	2	18.1	11	5	45.4
Hardy and M'Clintock*	8	3	37.5	8	3	37.5
Sinclair and Johnson*	24	6	25.	24	13	54.1
Arneth*	9	1	11.1	9	6	66.6
Braun, C.†	37	9	24.3	37	18	48.6
Klein*	11	2	22.2	12	12	100.0
	100	23	23.	183	107	58.4
Read, Wm.: Placenta Previa, 1861, 12 tables.	978	206	21.2	850	447	50.8
††Blacker: all since 1880	22	1	4.5	22	8	36.3
Kouwer	8	3	37.5	8	3	37.5
Ribbius	98	7	7.1	98	39	40.8
Stratz	57	1	1.7	57	36	63.
Fry	14	0	0	14	5	35.7
Galabin	92	15	16.1	92	69	75.
Hautel	123	12	9.7	123	92	74.1
Hirst	28	0	0	28	24	50
Siebert	24	10	16.8	24	8	33.3
Dorman	84	10	11.9	84	38	45.
Welti-Pinard	149	4	2.6	149	34	32.7
Lomer	236	21	8.9	178	105	60
Drejer	49	2	4.09	50	12	23.5
Platzer	46	4	8.7	46	25	53.2
Zedler	16	2	12.5	16	6	37.5
Higgins	75	8	10.6	?	?	
Rotunda Hospital	74	3	4.	?	?	
Murphy	61	2	3.2	?	?	
Klein	138	13	9.4	?	?	
Schauta	234	16	6.8	234	127	54.
Strassmann	231	22	9.5	231	144	61.2
Driessen	125	19	15.2	125	80	64.
Doranth	216	20	9.3	216	152	70.3
Fournier	7	0	0	7	3	43.
Koblanck	467	18	3.8	?	?	
DeLee	30	1	3.3	31	13	41.9
Amadi et Ferri	100	5	5.	100	32	32.
Behm	52	0	0	52	30	60.
Totals.	2756	213	7.4	1985	1075	54.1
Jewett: Am. Jour. Obst.	2010	221	10.9	2020	1159	57.3
Behm, omitted, repeated	40	0		40	31	
	4726	434	9.2	3965	2201	55.5
Abdominal Cesareans.						
††Cases collected by Holmes: also 7 babies	25	5	20.	25	9	36.
died within 14 days.					16	64.
Jewett: Am. J. Obs., p. 943, June, 1909.	95	11	11.5	97	37	34.
Davis, Asa, Am. J. Obs., p. 120, Jan. 1915.	21	2	9.5	21	7	33.3
Davis, E. P., Penn. M. J., p. 292, Jan., 1915.	18	0	0	18	7	37.7
Foulkrod: Am. J. Obs., p. 459, Mar. 1913.	4	1	25.	4	1	25.
Doederlein: Cent. f. Gyn. p. 1383, No. 38, 1913.	146	12	8.9	146	44	30.1
Total Cesareans	309	31	10.	311	111	25.6
Obstetric Treat.	4726	434	9.2	3965	2201	55.5
Preantiseptic Period.	1078	229	21.2	1033	554	53.6

*Murphy: Midwifery, 1862, p. 698, et seq.
†Braun, C.: Gynecology, 1881, p. 561.
††Blacker et seq. to Behm taken from table in "Cesarean Section an Improper Procedure,"
Jour. Am. Med. Assn., May 20, 1905.

servation of time of the operator, is a travesty on scientific endeavor. I feel that the modern trend of obstetric practice has been to apply surgical manipulation to normality to a degree which is not in consonance with refinement of judgment. What is needed is a reformation in the rules and the development of an obstetric conscience which will permit intervention only when intervention is imperatively needed. Strict indication is one thing, but the widespread use of operative interference with no indication except the whim, or plain obcecation of the attendant, has spelt disaster, has retarded the progress of obstetrics, and has fended off the days of conservation of the expectant mother and her unborn child. It is a reproach on the medical profession that a city like Newark may advertise the fact that it is safer to be delivered by a midwife than by a physician or in a hospital.

CONCLUSIONS

1. In safe conservative hands maternal and fetal mortalities have decreased in private practice.

2. The maternal and fetal death rates, in hospitals, have not shown an appreciable decline in one hundred years.

3. The fact that the death rate among the emergency cases (i.e., those sent in by medical attendants) is over ten times that of regular applicants in the New York Lying-in Hospital is a reflection on the preliminary medical training of the profession.

4. Scientific investigation of antenatal pathology which will promote a prophylactic therapy will lower infant mortalities more than the present attempts to do so by routine operative termination of labor.

5. A properly conducted prenatal clinic, combined with conservative conduct of labor is a more certain method for securing declining death rates than promiscuous intervention.

6. Under normal conditions, spontaneous labor, aided by proper analgesia, is the safest way for mother and child. Inordinately applied operative interferences increase the hazards of birth.

7. The authorities who have fostered a peculiar method of routine interference in all parturient women, with their imitators, have retarded the advance in obstetric care, and are part contributors to the high American mortalities incident to childbirth.

8. It is a lamentable thing that properly controlled midwives will have less mortality than those who practice a routine intervention.

9. The proponents of operative cults have produced no evidence to show that their systems are more worthy, less risky, and promise a higher conservation of life than carefully watched spontaneous labor.

10. There are no more reasons why all parturient women should be delivered by operation than that all people should be inflicted with routine enemata or catheterization.

11. A medical fad should be discountenanced: precept and example founded on injudicious enthusiasm lead to many unwise courses.

12. Indications for obstetric operations demand revision: certainly, they should be more clearly drawn and curtailed, rather than extended.

13. A wise conservation in obstetrics will be more productive of ideal results than injudiciously used skill.

14. Obstetric teaching is so deficient in most colleges that there should be a sharp and early improvement: so long as obstetric teaching is defective so long will obstetric results be bad in practice.

15. An obstetric curriculum should be devoted to practical instruction on the mannikin, in the class room, and in the clinic; obstetric surgery should be a very small part of the coordinated whole. The proper place of the latter is in postgraduate courses intended for those preparing for the specialty.

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FORCED LABOR; ITS STATUS IN OBSTETRIC TEACHING*

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FOR the purpose of this discussion we shall consider the comparative status of such procedures as:

1. The induction of premature labor in contracted pelves, with a conjugate vera of 8.5 cm. or more.

2. The induction of labor at estimated term in normal pelves by the introduction of the bag, bougie, or vaginal pack.

3. Procedures for the shortening of the course of the second stage of labor, such as the use of pituitary extract or of routine forceps when the head is below the spines, or on the pelvic floor, and the cervix is fully dilated, with deliberate discission of the outlet soft parts.

4. Measures which entirely eliminate the second stage of labor, as elective internal version, and elective cesarean section, and finally:

5. Hurrying the third stage by the immediate and forcible expression of the placenta, with the first uterine contraction.

It would seem that it is time for us as a Society, composed of the leading obstetricians of this country and Canada, to formulate certain

indications and methods of procedures and to agree as to the admitted status of the different forms of intervention.

A large proportion of our Fellows are teachers of obstetrics and gynecology in medical schools and our attitude, which voices as it does our criticism or commendation of a presented procedure, has much to do with moulding the ideas of the profession in the practice of obstetrics.

TABLE I*

ANALYSIS OF 100 CONSECUTIVE CASES
INCIDENCE OF CONTRACTED PELVIS†

Justo Minor Pelvis	36
Flat simple	25
Flat rachitic	2
Funnel	43
	106 or 10.6 per cent

*From The Long Island College Hospital, Maternity Service.
†Every patient has careful prenatal mensuration—checked up again on her discharge from the hospital.

TABLE II

PRESENTATIONS
INCIDENCE OF ABNORMAL PRESENTATIONS

Breech	27
Face and Brow	6
Transverse	4
Twins	4
Complex, hand and cord	1
	42
Vertex	958
	1000

As teachers we must distinguish between what is safe for the trained specialist to do, and what is safe for us to teach our students to do; for we must all admit that we are not turning out a trained product in obstetrics when we graduate our men from a medical college.

In order to justify our endorsement of such procedures as induction, prophylactic forceps, elective version, elective cesarean, and forced expulsion of the placenta, it must be shown that these procedures have reduced the dangers of childbirth for the child-bearing woman, and that the temporary relief gained from shortening the labor is not gained at the expense of greater trauma, infection, and subsequent invalidism than results from normal labor.

Further than this we must show that the occurrence of stillbirths and children not surviving the first week is actually reduced in number. Unless this can be demonstrated, meddling with the physiologic processes of labor should be discountenanced.

In this discussion we are not considering forced labor or its application to abnormalities, except in slight relative pelvic contractions, or

where the patient has reached term and the child promises to exceed
the normal limits, but we are discussing intervention in the course of
normal labor to shorten the process, and to relieve the woman of a
few hours of suffering.

Regarding hydrostatic bags, certain questions must be put and an-
swered. 1. Are they free from danger? 2. Do they always induce
labor? 3. Do they increase the frequency of operative termination?
To the first of these queries we must answer in the negative, for in
our experience, which has not been inconsiderable, the introduction
of the bag has increased the danger from infection, has displaced the
presenting parts, has caused malposition, and has allowed the presenta-
tion to become complicated by prolapse of the arm and cord.

TABLE III

ANALYSIS OF VERTEX CASES

L. O. A.	496
L. O. P.	28
R. O. A.	128
R. O. P.	306
	958

Spontaneous anterior rotation was the rule.

TABLE IV

Primipara	506
Multipara	494
	1000

Incidence almost equally divided.

In Reed's two hundred cases, twelve babies were lost; this is over
three times the mortality rate which has occurred in our clinic from
a study of a long series where every patient has been treated on the
principle of intelligent and aseptic expectancy. In Mosher's 270 cases,
there were three prolapsed cords. This is several times the incidence
found in normal labor.

If we are correct in our belief that there is real danger in making
vaginal examinations in labor during the first stage, and if we admit
that rectal examination really cuts down the dangers of contact infec-
tion, and that vaginal examinations add something to the risk of infec-
tion, then how can we accept putting a foreign body in the cervix
which remains there, obstructs drainage, and increases traumatism and
thus adds to the dangers of infection?

As teachers let us at least be consistent. Does the introduction of a
bag always induce labor? Here again we must answer in the negative;
for in Reed's series a second bag had to be introduced in four cases,
and all of us have had the experience that labor often ceases with the
expulsion of the bag from the cervix. On several occasions we have

seen the cervix recontract and labor pains entirely cease after the bag has been expelled.

One of my patients expelled three bags and then went on for two weeks without labor pains when she spontaneously delivered herself.

Forced dilatation of the cervix, notably in multiparae, does not necessarily induce labor. The idea that we can always induce labor by dilating the cervix is erroneous. This observation has been noted and reported on by many careful clinical observers.

In Dorman's excellent review of dry labors at the Woman's Hospital, he definitely states that induced labor is followed by a higher operative termination than in labors allowed to end spontaneously and concludes with the following remarks:

"The use of the dilating bag even when employed to induce labor, did not reduce mortality and seemed unfavorable to the fetus: with an operative termination of 54 per cent of such induced labors, an average of over 12 hours, the question arises as to whether induction of labor by bags is justifiable."

The number of forceps and versions in both Reed's and Mosher's series show a higher incidence than is common in good obstetric practice; consequently we feel that induction of labor in the minor degrees of contracted pelvis is not for the best interests of the mother or the child, and as for induction in those cases where the patient has supposedly reached term, we feel that until we can accurately determine the beginning of pregnancy we cannot even with mensuration accurately determine when it should terminate.

TABLE V

CONDITIONS COMPLICATING THE PREGNANCY AND LABOR

Endocarditis, decompensated	
Mitral stenosis	4
Mitral regurgitation	3
Complete premature separation of the placenta	2
Partial separation	9
Large fibroid tumors of the uterus	3
Subluxation of the sacroiliac joint	1
Toxemia of the later months	37
Placenta previa	2
Prolapsed cord	2
	63

Furthermore, so many of these cases surprise us by having a spontaneous delivery that it is but fair that they all should have the test of labor, and then be handled on their obstetric merits.

Shortening the second stage of labor by the use of pituitary extract, or the routine use of prophylactic forceps with lateral discission of the soft parts, should not be taught in our medical schools. Pituitary extract is never safe while the child is in the uterus, for the tetanic spasm which it occasionally induces and which cannot be foretold,

has cost the life of many babies, even when the head has been in the vagina. The spasm induced has repeatedly separated the placenta from its uterine attachment or so compressed it against the fetal tampon that the placental circulation has been cut off.

TABLE VI

INCIDENCE OF OPERATIVE INTERVENTION

Forceps, low and median	22	
Version, internal 3		
Version, bipolar 2	5	
Induction of labor by bag for toxemia	4	
Manual conversion of face to vertex	2	
Perforation of after-coming head	1	
Cleidotomy	1	
Cesarean section	8	
	43	
Incidence of forceps		2.2 per cent
Incidence of cesarean		0.8 per cent
Incidence of version		0.5 per cent

TABLE VII

THIRD STAGE, CONDUCT IN 1000 CASES

Spontaneous delivery of placenta after signs of separation were evident, with or without pressure on fundus		997
Manual removal of retained placenta		3
		1000
Blood loss, varying from	10-200 c.c.	309
	200-400 c.c.	501
	400-500 c.c.	137
	Over 600 c.c.	3
		1000

Does shortening the second stage by surgical anesthesia, forceps extraction, and discission of the soft parts, thus relieving the woman of an hour or two of pain which can be safely controlled by chloroform a la Reine, or gas-oxygen anesthesia, leave the woman in a better physical state than less heroic measures?

While we know that this can be and is done by the expert with little or no ill effects to either mother or child, we feel that such pernicious teaching in the hands of the practitioner will cause even more damage, morbidity and mortality to both than we are getting with more conservative methods. For our own experience has been that, given a normal pelvis with a cephalic presentation in one of the anterior positions, the woman who delivers herself spontaneously, even without the presence of a physician, has less actual injury to her structures, than when she is attended by some one who makes an attempt at disturbing the physiologic processes.

Time and physiologic dilatation with the bag of waters intact is the only way that cervical injury can be minimized. That version has a

distinct place in obstetrics is admitted, and there is no doubt that its
indications should be wider, as a large proportion of our occipitopos-
teriors would be better treated by version than by our present method
of expectancy. Moreover we owe to Potter a great debt in perfecting
and popularizing his improved technic of version, but with it all, he
has not established *its* indications though he has essayed to establish *his*
indications. Version cannot be considered an elective procedure in
normal cases.

TABLE VIII

MORBIDITY

Rectal examinations used exclusively, except in dystocia Morbidity—A temperature of 101° F. for over 24 hours is charted as a febrile convalescence	
Febrile puerperia	59
Afebrile	941
	1000
Morbidity	5.9 per cent

TABLE IX

COMPLICATIONS OF PUERPERIA

Febrile puerperia	59
Infection of repaired perineum	11
Pelvic cellulitis	26
Thrombophlebitis	6
Blood stream infection	9
Mastitis	7
	59
Of the blood stream infection	
Culture showed viridans in	3
Culture showed streptococcus longus in	6
Deaths, in 1000 cases	
From influenza pneumonia	1
From puerperal infection (Streptococcus viridans in blood stream—same obtained from throat on admission)	3
	4
Mortality	.04
In 4500 consecutive cases, including this 1000, 7 deaths, making a mortality for our last 4500 deliveries	.0015 per cent

Elective cesarean section is being done for constantly widening
indications, and undoubtedly has a place in our obstetric armamenta-
rium, but here again this easy method of delivery is being used too
freely and without well grounded obstetric indications.

In two hundred cases of labor in contracted pelvis, recently studied,
we found that 81 per cent delivered spontaneously, or the labor was
terminated with low forceps. This certainly shows that each case of
relative contraction is at least entitled to a proper test of labor before
the abdomen is sectioned.

While the application of forceps to the engaged head in the presence of properly prepared soft parts is admitted to be a most valuable procedure, both in the interests of the mother and the child, when the fetal arrest is due to failing powers, it has its limitation of safety as a routine measure, and definitely increases trauma to the soft parts. Therefore, we feel that shortening the second stage by intervention with the forceps is not justifiable as a routine measure any more than eliminating the second stage and delivering every child whose head will come into the brim, by elective version and extraction, with no other indication than to eliminate the second stage of labor and thus

TABLE X

ANALYSIS OF FETAL DEATHS IN 1000 CONSECUTIVE CASES

Stillbirths.
    X 1 Large head, breech presentation
    X 2 Large head, breech presentation
    X 3 Large head, breech presentation

(Comment—There is always difficulty in estimating size of after-coming head.)
      4 Accidental Hemorrhage
      5 Accidental Hemorrhage
      6 Placenta previa
    X 7 Version of transverse, cord around neck, breech extraction.
      8 Toxemia
      9 Toxemia
     10 Toxemia
     11 Toxemia
     12 Premature Syphilis
     13 Macerated 2nd twin—1st living
     14 Macerated 2nd twin—1st living
    X 15 Full term, vertex asphyxia—2 coils cord around neck
    X 16 F. I. Stillbirth—cause not determined
     17 F. I.   "   "   macerated
     18 F. I.   "   "   macerated
     19 F. I.   "   "   macerated

Infant deaths:
    X 1 Acrania—died in 3 hours
      2 F. I.   died in 4 days
      3 F. I.   died in 4 days
      4 F. I.   died in 4 days—premature
      5 F. I.   died in 4 days—umbilical hemorrhage
      6 F. I.   died in 1 day.
Stillbirths   19   1.9 per cent
Infant deaths in first 14 days   6   0.6 per cent
Stillbirths and deaths up to 14 days   25   2.5 per cent
Six—checked (X) stillbirths, might have been saved had our obstetrics been more nearly perfect.
The remaining 13 were beyond all hope, even had we been perfect obstetricians.
In 4500 consecutive deliveries—Cause of 7 Maternal deaths.
    X 1 Postpartum hemorrhage
      2 Accidental hemorrhage
      4 Mitral stenosis—broken compensation, not confirmed.
      3 Influenza-pneumonia
    X 5 Puerperal Infection
    X 6 Puerperal Infection
                   During epidemic following Influenza
    X 7 Puerperal Infection

relieve the woman of the pains and agonies of childbirth. Neither is it safe teaching for the student or graduate without months or years of special training.

Take Potter's own report before the Philadelphia Obstetric Society, of 1,113 labors with 920 versions and 80 cesarean sections, with a fetal mortality of 6.7, and compare it with the figures resulting from intelligent expectancy and indicated intervention which I will show you in subsequent tables.

All of Potter's cases were attended by himself, a trained expert, whose experience in version is probably greater than any other living man, yet his operative incidence is so much greater than has been shown to be necessary in good practice, and his fetal mortality so much higher, that I cannot see on what ground he claims endorsement for his procedure.

Furthermore, cesarean section is not without its morbidity and its mortality. Beck showed that there was a 30 per cent morbidity in his study of 107 cases. Rupture of the cesarean scar is not an unknown possibility and, in my collective study of 2,000 cases done by the leading operators throughout the country, there was a mortality of nearly 10 per cent, and of over 2 per cent in the elective group.

Another procedure that should come up for consideration and comparison, is hurrying the third stage of labor by expression of the placenta with the first uterine contraction after the child has been delivered. This is definitely unphysiologic in that it takes time for the uterus by its contraction and retraction, to separate and expel the placenta and produce proper uterine hemostasis. While this practice may be safe in the hands of the trained specialist, it is bad practice and bad teaching for the practitioner and for students.

A careful study of the foregoing statistics can leave no question in the mind of any of my auditors that for the ordinarily trained man, intelligent expectancy and indicated intervention in the interest of only the mother and child, not for the convenience of the practitioner, is the safest practice and is surest in its results.

287 CLINTON AVENUE.

THE DRUDGERY OF OBSTETRICS AND ITS EFFECT UPON THE PRACTICE OF THE ART, WITH SOME SUGGESTIONS FOR RELIEF*

By Brooke M. Anspach, M.D., Philadelphia, Pa.

TO RECITE the demands made upon the practitioner of obstetrics, that constitute the drudgery incident to the practice of the art, is like carrying coals to Newcastle. For the purposes of this paper, I shall mention briefly only those that seem to be the most distressing.

The uncertainty as regards the time of onset of labor is proverbial. Who can determine in a given case precisely when labor will take place? Although, in a majority of instances, computed by the customary rule, the date can be fixed approximately, a variation of from ten days to two weeks is not unusual. Such variation cannot be regarded as abnormal so long as there is no way of ascertaining precisely when ovulation and conception took place. This uncertainty leads to much annoyance and inconvenience for the patient, her family, the doctor, the nurse, as well as for the management of the hospital, if she elects to go to one, in which she is to be delivered.

It is upon the obstetrician especially that the burden falls most heavily. Thus he finds it difficult to leave town or must delay his going, since some one is always overdue; or if the coast seems clear and he is permitted to depart in peace, an unexpected or premature labor is sure to call him back. And so his plans invariably miscarry, for he is either detained at home, or sent for when he leaves.

As soon as the patient falls into labor, the obstetrician must revise his daily routine to some extent at least, rearranging his visits and his work so as to be able to reach her as quickly as possible, or he may accept the risk of the day's work and trust to good fortune to be on hand when he is needed. In complicated cases there is no choice, for here he must be in more or less constant attendance throughout the entire labor. How frequently it happens, in such cases, that, at the end of an extended period of observation, the best judgment and skill of the obstetric attendant are required to effect a successful outcome, and this, too, at the most inopportune time, when the physician is exhausted and physically and mentally unfit to undertake the work.

It is doubtful whether there is any more troublesome exigency in any branch of medicine or surgery, or one that requires more well-balanced judgment and greater skill. Neither is there any situation

in which the physician feels more keenly the burden of responsibility—the mother and the child, the anxious relatives. It is an undeniable fact that at this time, in order to do his work most successfully, the obstetrician, as well as his nurse and assistants, should be unfatigued.

Upon the obstetric nurse the hardship is in some respects even greater. She it is who spends weary hours listening to complaints, attempting repeatedly to comfort the patient, who, forsooth, cannot be comforted. She must bear the stress of possible operative delivery at the conclusion of this trying period, followed by the immediate after-care. She has two patients instead of one. In private home cases many additional cares are added to her already heavy burdens—the preparation of meals, the laundry, dealing with the servants and members of the family, etc.

As a consequence, many physicians and most nurses dislike obstetrics, and avoid it to as great an extent as possible. It is often quite difficult to persuade a good surgical nurse to undertake obstetric nursing. The number of physicians who endeavor to practice obstetrics is small as compared to those who enter other specialties, and in the nursing field the most skillful workers do not commonly select this as their chosen sphere of usefulness.

What is the result of the unusual demands made upon the time, convenience, and patience of the obstetrician? Does it influence him in his conduct of labor? First of all, it is natural that, in order to save himself as much as possible, so that he may be in better condition to overcome the difficulties that he may be required to face later, the obstetrician may not, during the earlier stages of labor, give his patient the close attention she might reasonably expect to receive. The question here arises whether obstetricians as a class are doing all that is possible, under existing conditions, to alleviate the pains of the first stage of labor. "Twilight sleep" has come and, fortunately, gone. Was there not, however, some little truth, at least, to be taken from it? Would it not be desirable to do a little more than is done usually to ease the sufferings of the first stage, for example, with either morphine and scopolamine, or with nitrous oxide and oxygen, or with all of these combined? And in the second stage, is the obstetric attendant usually at hand to begin analgesia as soon as complete dilatation of the os is accomplished? Does not the patient often wait weary minutes or even hours until the obstetrician arrives? May it not be merely the joy that the pain is over and that another soul is born into the world that keeps some of our patients from reminding us of the pains they have been permitted to suffer and to reproach us for the little we tried to relieve them?

It is not hard to perceive that efforts, conscious and subconscious, are made to remove these difficulties in obstetric practice. The ex-

pectant mother grasps quickly at any new plan that will bring on her labor at the appointed time, that will hurry it along and save her from pain, etc., little knowing or weighing the disadvantage to herself or to her baby. And the obstetrician, no matter how conscientious he may be, is almost tempted to induce labor at a set date, administer stimulants for the pains, and adopt manipulative or operative measures to shorten the period of parturition. But who would have the temerity to declare that an artificially induced, conducted, or terminated labor is as safe for the mother and the child as a normal one? And are we not all agreed that the best plan is to let the obstetric patient alone until some actual indication arises for giving assistance?

This problem, and it is by no means an easy one, of relieving the practitioner of the drudgery of obstetrics, is yet to be solved. We can do no more than formulate plans, and then put them to the test of experience. With this purpose in view, I venture to offer the following observations and suggestions:

While the almost general and universal use of hospitals for obstetric cases has infinitely lessened the drudgery of obstetrics, much is still to be desired in the direction of securing close cooperation between the obstetric intern and the practicing obstetrician. The obstetric intern should not only be permitted, but should actually be trained to examine the women in labor under his care. Indeed, before she enters the hospital, the patient should be made to understand that the practicing obstetrician will call into cooperation with him, the obstetric intern.

During pregnancy the obstetrician should be careful to write a full history and make complete and regular notes of visits and examinations, including the results of pelvimetry, the diagnosis of position, etc., which should be sent to the hospital as soon as the patient goes into labor. These notes, with perhaps a telephone conversation, will give the obstetric intern the information he requires. As a result, he will be better able to look after the patient during the early stages, and will summon the obstetrician when he is needed. In the larger maternity hospitals fresh attendants may be provided throughout labor by a shifting staff of anesthetist, two nurses, and an obstetric intern, every eight or twelve hours.

If the period of labor of a patient continues beyond the time allotted to the staff on duty when she is admitted, the notes made by the first staff may be turned over to their successors. By this plan perfect analgesia throughout labor may be maintained by well-trained attendants who are unfatigued and thoroughly awake to the necessities and requirements of the case. There need be no attempt to hurry labor, unless this appears to be to the distinct advantage of the mother or child. Induced labor will be unnecessary, and if the patient requires

skilled operative or manipulative attention, this can be secured from one who has not borne the stress of the earlier stages, and who is unfatigued and therefore at his best.

An elaboration and possibly an outgrowth of this plan would be the association of several obstetricians, men of approximately equal standing and experience in one maternity hospital. Instead of engaging a particular obstetrician to care for her, the patient would enlist the services of the group collectively, stipulating that she would be willing that any one of them should look after her, the choice depending upon the time of her delivery.

In certain large surgical centers, a patient is not permitted to name his surgeon, the selection being made by the management. The layman is satisfied with this arrangement since he realizes that, after all, it is to his advantage. So, too, the laywoman appreciating that what is done is to her advantage, might grow perfectly content. She might then look confidently forward to securing comfortable accommodations, regardless of when labor begins, to perfectly conducted analgesia, and to the services of a skillful obstetrician at his best. She would be spared the induced labor, the long hours of indifferent or absent analgesia, and the anxiety of waiting for the physician to come. The result to women as a whole could scarcely fail to show improvement. More physicians and nurses would take up obstetrics enthusiastically, and the most important episode in the life of any woman would receive the careful and skillful attention it deserves.

1827 SPRUCE STREET.

BASAL METABOLISM IN PREGNANCY AND THE PUERPERIUM*

By Joseph L. Baer, M.D., Chicago, Ill.

THIS study comprises a series of basal metabolism readings in normal women in pregnancy and the puerperium, an attempt at interpretation of the results, and some interesting pathologic cases.

While the literature on the general subject has become quite voluminous, very little has been published that bears on the subject matter of this paper.

The experimental work of Warburg on the respiratory exchange in sea-urchins' eggs showed that the oxygen absorption of the unfertilized ovum is about 500 times that of the sperm cell of the same species. But when the two cells unite in the act of fertilization, the oxygen absorption goes up to about 3500 times that of the sperm. It is safe to say that something like this occurs in the mammalian ovum upon fertilization. The energy metabolism of a mammalian ovum cannot, however, be studied at an early stage, and it is not until well beyond the middle of pregnancy that the respiratory exchange of the fetus is large enough to be measured by existing means.

Murlin investigated what kinds of material are oxidized to furnish the energy in the fetus and new-born and also how much energy is thus set free in the pregnant woman and new-born child in comparison with the adult?

Several observers had noted a rising respiratory quotient during pregnancy in both lower animals and the human subject and there is no doubt from the observations of Carpenter and Murlin, and Hasselbalch that the respiratory quotient is higher just before parturition than just after, but they are not certain to what extent the limited diet usually allowed the mother in the days immediately following delivery is responsible.

Magnus-Levy seems to have made the first observations ever recorded on the energy metabolism of the pregnant woman and he noted an increase in oxygen absorption from 2.8 c.c. per kilogram per minute in the third month to 3.3 c.c. in the eighth, a rise of 17 per cent.

In the woman pregnant with a single fetus the observations of Zuntz, Carpenter and Murlin, and Hasselbalch agree in showing an extra metabolism near term of about 4 per cent over that of the same woman or other women in complete sexual rest. All these authors surmise that

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this is scarcely more than may be accounted for by the increased respiratory activity necessary to preserve the hydrogen-ion concentration of the mother's blood.

Carpenter and Murlin made observations in three cases of human pregnancy at the Nutritional Laboratory in Boston. Two primiparae and one multipara were observed in the bed calorimeter for some weeks previous to parturition and mother and child were placed together in the calorimeter as soon thereafter as possible.

In two of the cases the comparison of antepartum and postpartum metabolism of mother and offspring together showed a difference of less than 1 per cent. The other case showed a difference of 7 per cent. The authors say that the curve of total energy metabolism of the mother and offspring suffered no deflection at parturition. The demands on the mother's digestive system are not greater. She is called upon to supply the same amount of energy in potential form to herself and child immediately after parturition that she did to herself and child immediately before it.

The rate of oxidation or heat production per unit of weight for the puerperal woman in these cases was 11 per cent higher than the average for 8 nonpregnant women and 7 per cent higher than that of the same subject just before delivery, the difference being ascribed partly to the increased activity of the mammary glands and in part to the stimulating effects of the products of involution.

Snell, Ford, and Rowntree have recently shown that menstruation affects the basal metabolism rate in women in health and disease. A rather constant rise occurs during menstruation or in the premenstrual period, this rise being followed by a postmenstrual fall.

Basal metabolism may be defined as the measure of the energy metabolism of a normal subject at complete rest and in the postabsorptive state. It is determined by ascertaining the heat production or gaseous interchange in such a subject during a certain period and may be expressed in calories per kilogram of weight of the subject. The earlier investigations of Du Bois and others in a few carefully studied cases of thyroid disease revealed the possibility of utilizing the basal metabolic rate as a method of clinical investigation.

The clinical study of basal metabolism may be by one of two methods: By direct or by indirect calorimetry. The calorimeter itself may be either a chamber calorimeter in which the subject is placed and breathes freely, or it may be a calorimeter of the nose-breathing or the mouth-breathing type in which the inspired and expired air and gases are mechanically separated.

Direct calorimetry depends upon the direct measurement of the heat of radiation, conduction and vaporization. Indirect calorimetry

depends upon the measurement of oxygen consumption with or without measurement of CO_2 production.

Determinations based solely on O_2 consumption are generally accepted by Benedict and others.

For this work, which was begun a year ago, it was found essential to have a light, portable, bedside apparatus. The Jones machine was considered, and after checking it against the results obtained with the available Benedict apparatus it was found entirely satisfactory, and thereafter was used throughout the series.*

Early in the work certain practical difficulties appeared. The cases were obtained from among the women of the Michael Reese Maternity prenatal clinic. Attempts to have the women prepare themselves by fasting overnight at home and then coming to the maternity for a 30 minute rest period soon proved impracticable, as the women frequently broke their fast, or complained because of the long street car ride before breakfast, and the plan was then altered to admit these women to the maternity on the previous day, putting them at rest and having them under proper conditions. Many women, having been subjected to first readings and being out-patients not under complete control, failed to return for subsequent readings until they went into labor. Some of the women could not be made to cooperate in spite of repeated trials and had to be dropped from the series. Pathologic conditions developing in pregnancy and the puerperium barred still others. As a result of these difficulties the number of properly completed cases, that is, successive readings on the same patient, dwindled from 105 to 44, on which these results are based.

Patients were given the usual preparation which included a light evening meal, thereafter only water until midnight, then nothing by mouth until the morning test was completed, no enema, no cathartics, and 30 minutes of absolute rest in bed and quiet before the readings were begun. These were taken between 8 and 10 A.M. In each case if two consecutive readings came within .1 minute, a third was not deemed necessary for that observation.

The charts shown extend from the thirty-fourth week of pregnancy to the 10th day of the puerperium. Readings earlier in pregnancy were insufficient in this series to warrant reaching an average. It may be stated that such rates as were obtained in the early weeks showed little or no increase above the normal.

The curve shows a gradual rise from $+26$ in the thirty-fourth week

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*A personal communication from Professor A. J. Carlson, Head of Department of Physiology, University of Chicago, as to the clinical accuracy of the Jones metabolimeter reads as follows:

"My dear Dr. Baer: Referring to your letter of the 6th, and our telephone conversation of a week ago, I wish to say that we have made a number of check tests on the Benedict Portable Calorimeter, and the Jones Metabolimeter. In our experience the Jones apparatus checks with the Benedict within 2 per cent, that is to say, as closely as the Benedict apparatus checks against itself on a series of tests on the same person during any continuous period of observation."

to + 33 in the fortieth week, a moderate drop to – 15 on the third day postpartum and a fall to + 5 by the seventh day and normal by the eleventh day. The highest and lowest readings show somewhat less accurately a similar rise and fall.

The second chart gives the figures from which the curve was constructed.

The ages ranged from eighteen to forty-two years. There were 18 primiparae and 26 multiparae ranging from para ii to para vii. No distinction as to metabolic rate values could be drawn on this basis, but in the continuance of the work, patients are being limited chiefly

CHART I
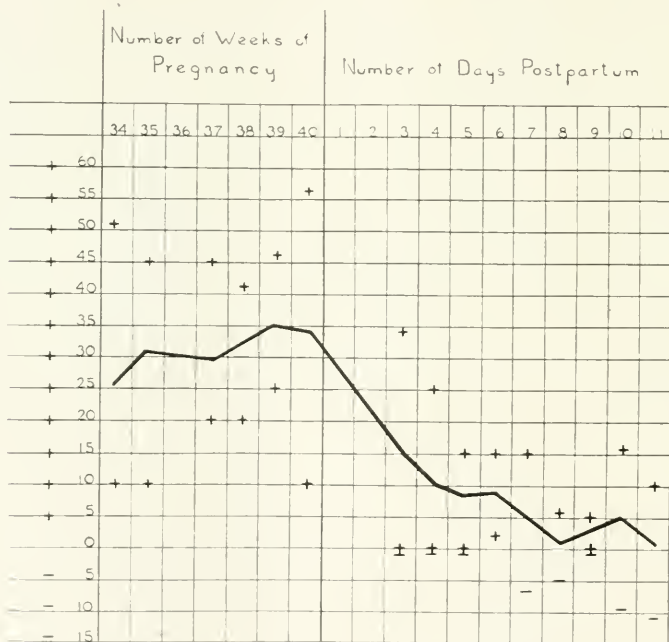
to the primiparae as they are more willing to remain overnight in the maternity than the mothers.

It was intended to admit only healthy women to the series. However, 2 cases of thyroid involvement were included in the series. Cases 78 and 79 showed a symmetrical enlargement without symptoms, were below the series average in metabolic rate, and had the characteristic drop of the puerperium. If thyroid enlargement in pregnancy is primarily compensatory in nature, the results obtained in these two cases may be accepted as further evidence of that concept. Five cases of toxemia of pregnancy associated with increased blood pressure and urinary findings of mild degree developed in the series, Nos. 19, 26, 34, 47, 57, and were not considered, but in only 2 instances did these

vary from the general averages obtained. No. 14 was a para iv with marked acidosis who gave birth to twins one of which died. The second, No. 26, a para i had a blood pressure of 158 systolic, albumin + +, was a low forceps, and had fever from the third to the tenth day of the puerperium. Her rates were + 45 in the thirty-fifth week, + 35 in the thirty-seventh week, + 18 on the third day of the puerperium, and + 11 on the tenth day of the puerperium. Three cases of pyelitis, Nos. 16,

CHART II

LENGTH OF PREGNANCY	NUMBER OF PATIENTS	HIGHEST RATE	LOWEST RATE	AVERAGE OF ALL READINGS
34th Week	8	+53	+10	+26
35th "	4	+45	+10	+31
36th "				
37th "	11	+45	+20	+29
38th "	6	+42	+20	+33
39th "	12	+46	+25	+35
40th "	11	+57	+10	+33
1st Day postpartum				
2nd " " "				
3rd " " "	14	+34	0	+15
4th " " "	13	+25	0	+11
5th " " "	4	+15	0	+ 8
6th " " "	3	+15	+ 3	+ 9
7th " " "	4	+15	− 7	+ 5
8th " " "	3	+ 6	− 5	+ 2
9th " " "	3	+ 5	0	+ 3
10th " " "	17	+17	− 8	+ 5.8
11th " " "	14	+10	−12	+ 1.4

Figures from which curve in Chart I was constructed.

45, and 62, one of which (62) likewise had a low grade puerperal infection, showed no great variation from the average findings. Eight cases developed fever in the puerperium, No. 9, bronchitis, No. 11, mild puerperal infection, Nos. 16 and 45, pyelitis, No. 48—100.8 on the seventh day; No. 62, pyelitis and puerperal infection; No. 65, abdominal pain and 101 on the eighth day. In none of these cases were readings taken until after 24 hours of normal temperature, and all

except No. 62 conformed generally to the normal averages. Her rates were + 55 in the thirty-seventh week, – 45 in the thirty-ninth week, + 25 on the fourth day of the puerperium and + 17 on the tenth day.

The obstetrical pathology included one transverse presentation, two cases of twins, two cases of breech presentation, and two microcephalic monsters. Labor was spontaneous in all cases excepting two low forceps, one mid-forceps, two cases of version and extraction and two cases of induction of labor—one by means of castor oil, quinine and separation of the membranes; the other by the introduction of the Voorhees bag. The average loss of weight of the cases seen in the thirty-ninth and fortieth week, and again on the third day postpartum was 7.257 kilograms; of this loss the average weight of the babies in this group was 3342 grams; the average weight of the placentas was 813 grams, a combined average per mother of 4155 grams of rapidly growing tissues. If the increased metabolic rates in late pregnancy found in this work are confirmed by others a possible explanation may lie in the presence within the maternal organism of these young and rapidly growing tissues with a high energy production and utilization.

The incomplete return to normal rates in the early days of the puerperium may be due to the presence of the large uterine mass undergoing absorption, and to the beginning of lactation.

Separating the babies according to sex gave in the thirty-ninth and fortieth week group an average rate for the mothers bearing male fetuses of + 37, and of those bearing female fetuses of + 34. Fetal sex in other words seems to play no rôle. This is in conformity with the results obtained by Talbot in his exceedingly careful and comprehensive work covering studies of children from birth to adolescence. He found the curves identical in the two sexes until a weight of 8 kilograms was reached, at which point, and up to 31 kilograms, the rate for boys distinctly exceeded that for girls.

Pulse rates were recorded for every observation made. No case with tachycardia was admitted to the series. Thirty-eight observations ranged between 80 and 90 in late pregnancy, while in the puerperium 14 ranged between 60 and 70, 14 between 70 and 80, and 22 between 80 and 90.

Several other cases not included in the series deserve special mention. Through the courtesy of Dr. L. E. Frankenthal, Case 8, a para ii, aged thirty-four, on whom he had made a diagnosis of macerated fetus, was seen in about the thirty-sixth week of pregnancy. At this time she complained of headache, but had no other symptoms. Blood pressure: systolic, 132; diastolic, 88. Urinary findings negative. Her reading was +10, confirmed by Dr. Harrie Jones, who did not know of the suspected dead fetus. Shortly thereafter she went into spontaneous labor, was delivered of a 46 cm. macerated fetus, and her reading on the sixth day of the puerperium was +8.

CASE 17. A para xi, aged 41, with a very large nodular thyroid without subjective symptoms gave the following readings: 39th week, +65, pulse 72. 40th

week, +65, pulse 84. Spontaneous delivery in 10 hours; and on the third day of the puerperium the reading was -37, pulse 84; on the 10th day, +22, pulse 80. If this case be considered a mild thyroid toxicosis and 20 points be deducted from all readings her curve would agree fairly well with the curve of the normal series.

CASES 12 and 14: Twins. The former showed pregnancy readings of +33 in the thirty-seventh week and +50 in the 39th week, the weight of the babies was 1270 gm. (female) who survived and 1700 gm. (male) who died 5 hours postpartum. The latter was a toxemia with acidosis mentioned elsewhere whose rates were +48 in the thirty-eighth week and +67 in the fortieth week and whose babies weighed 2890 (male) living and 1410 (female) microcephalic died in 12 hours.

SUMMARY OF RESULTS

1. The basal metabolic rate in 44 normal cases in late pregnancy averages 33 to 35 per cent above the normal for nonpregnant women of a surface area equal to the pregnant woman.

2. Three days after delivery the average basal metabolic rate is only 15 per cent above normal.

3. Seven to ten days postpartum the average basal metabolic rate is approximately normal.

4. Death of the fetus in late pregnancy is detectable in a woman otherwise normal by a drop in the basal metabolic rate compared with the average in this series.

CONCLUSIONS

The following conclusions seem justified:

1. The increased basal metabolic rate in late pregnancy is due to the growing demands of the fetal organism and placenta.

2. The incomplete or delayed return to normal is due to involution of the uterus and the onset of lactation.

3. Twin pregnancy should show a rate above the average for single pregnancy when both twins are well developed.

4. Thyroid enlargement may occur in pregnancy without increasing the basal metabolic rate above the averages obtained in this series.

5. Differential diagnosis between uterine tumor and pregnancy will not be helped unless greater refinements in method show increased rates much earlier than in this series. The x-ray can be called on as early as the fifth month and with reasonable certainty in the sixth month.

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A COMPARISON BY STATISTICAL METHODS OF CERTAIN EXTERNAL PELVIC MEASUREMENTS OF FRENCH AND AMERICAN WOMEN*

By Fred L. Adair, M.D., Minneapolis, Minn.

I. INTRODUCTION

THE value of external pelvimetry is now generally admitted to be of little consequence for the determination of the actual size of the parturient canal. But it is conceded by many that it has distinct value as a routine obstetric procedure in the determination of the type of pelvis and the detection of variations from the norm. It is quite common to use the measurements made in one country as criteria for conclusions and the determination of procedures in other countries. It seemed to the author that it might be of interest and of some value (1) to apply some mathematical and statistical methods to the study of external pelvic measurements; (2) to compare a series of measurements of French women with a similar series of measurements of American women which were made by the same individual, thus reducing the personal equation to the minimum; (3) to draw, if possible, some conclusion regarding the determination of the norm of the obstetric pelvis as shown by external measurements, and to point out any national differences or similarities which might occur.

II. LITERATURE

The Present Status of Pelvimetry.—Ehrenfest (1906) thinks that only three measurements can be made with any degree of accuracy, namely, the true conjugate, and the anteroposterior and transverse diameters of the outlet. He believes that the external measurements cannot be made within 0.5 to 1 centimeter of accuracy. The original purpose of external pelvimetry, as suggested by Baudelocque, is now generally recognized as fallacious in that external pelvimetry is useless for the determination of the internal measurements of the pelvis. He believes, however, that it is valuable for the determination of the form of the pelvis.

Cragin (1916), in reference to the value of external pelvimetry, states "It is well known that pelvimetry, and especially external pelvimetry, cannot be depended upon alone * * * external pelvimetry has value, however, and often great value in the diagnosis of abnormal pelves * * * while the interspinous and intercristal diameters by themselves are often of little value, the relative measurements are of great value in diagnosis * * * the external conjugate varies greatly in size in different individuals and often gives little information of value."

Huntington (1917) considers that five pelvic measurements have proved to be of practical value, namely, the intercristal, interspinous, external conjugate, diagonal conjugate, and true conjugate. He quotes the following average measurements as given by the various authors. Ahlfeld—external conjugate 19.5 to 20, interspinous 24, intercristal 28; Bumm—external conjugate 18 to 20, interspinous 26, intercristal 29; Jellett—external conjugate 20, interspinous 26.5, intercristal 28 to 29; Cragin—external conjugate 20, interspinous 26, intercristal 28; Williams—external conjugate 21, interspinous 26, intercristal 29. The Boston Lying-in Hospital gives the following average measurements: external conjugate 20.7, interspinous 24.4, intercristal 28.2. The author states that in the outpatient department of the Boston Lying-in Hospital in 918 cases, about 47 per cent had measurements less than 19, 24, and 27.

Bourne (1919) emphasizes the importance of external pelvic measurements as a part of antenatal examination. He considers that the external conjugate is of considerable importance. He makes the measurement from the depression below the tip of the last lumbar spine to the *inner surface* of the upper border of the symphysis pubes. He finds this measurement to be about 18.5 centimeters. He considers the average of 25 centimeters which is usually given for the interspinous as too high. In his experience it ranges from 21 to 25, usually about 22.5 centimeters. The intercristal measurement varies in his experience from 26 to 27.5 centimeters.

Williams (1919) considers that external pelvic measurements are of considerable value. He believes that while they give no accurate information as to the actual size of the parturient canal, certain general conclusions may be drawn as to the size and variation of the pelvis. He thinks that four external measurements, not considering those of the outlet, are of value, namely, the interspinous, intercristal, intertrochanteric, and the external conjugate. He gives the average normal measurements in the living woman as 26, 29, 32, and 21, respectively. He thinks that the normal difference between the interspinous and the intercristal is about 2.5 to 3 centimeters.

RACIAL COMPARISON

Riggs (1904) examined 1500 cases, 779 white and 721 negro. He considered the cases from the standpoint of race, dividing the pelves into normal, generally contracted, simple flat and rachitic. The average measurements for the normal white pelvis as given by him are: external conjugate 19.71; interspinous 25.47; intercristal 27.99; intertrochanteric 30.9. For the normal negro pelvis he gives as the average measurements: external conjugate 19.32; interspinous 23.99; intercristal 26; intertrochanteric 30.09. His comparison of the pelves of the two races shows that those of the white women are lower and broader, while those of the negroes are more narrow and relatively deep, and that a much higher percentage of the negro pelves conform to the type known as generally contracted pelves.

Acosta-Sison and Calderon (1919) give comparative tables of average measurements based on data taken from the different authors and compare them with the pelves of the Filipinas of which they measured some 1200 cases. They measured these diameters from points corresponding to the inner and outer surfaces of the bone, using those taken from the outer surfaces for comparative purposes. They give the results of their examination and state that the type of the Filipina pelvis is different from that of the white American and of the negro. They state that the average normal measurements are similar to the generally contracted pelves of the white American. They plotted curves of some of these measurements of which we will mention only three, namely, the external conjugate, interspinous, and intercristal. The curves are plotted on pelvic measurements down to one-tenth of one centimeter. Based on these rather minute pelvic measurements, the authors thought they could isolate three major and two minor types of Filipina pelves. They thought that the different types might indicate a mixture of the various Philippine peoples. As will be referred to later, these curves have been reduced as accurately as possible to terms of the grosser measurements which the author has used in his series so that the types of curves could be better compared with his own measurements.

From the literature it is apparent that most authors consider the length of the different measurements as of great importance when considered together, and the relationship of the different measurements to one another is thought to be of definite value. Van der Hoeven (1912) states that the difference between the interspinous and the intercristal measurements is generally considered to be about 3 centimeters. From his study and observations, he concludes that the difference between these two in normal and generally contracted pelves varies from 1.4 to 5 centimeters, while the difference between

each one of the measurements and the one which is next larger is about 3 centimeters.

It is apparent from the literature that not a great deal of work has been done in the comparison of the pelves of different races and different nationalities. The most that has been done has been worked out by Williams and his associates in the comparison of the pelves of negroes with those of the white race.

Emmons (1913) studied museum specimens of the pelves of American Indians very carefully, but made only two external measurements which can be utilized in the present analysis.

Acosta-Sison and Calderon have studied the Filipina pelvis quite carefully and compared it with the pelves of the negro and the white American, using the data compiled by Williams and others. Most of these comparisons, with the exception of the work done by Acosta-Sison and Calderon, are based on the average, maximum and minimum measurements. Acosta-Sison and Calderon worked out some frequency curves which seem to give a false impression because they are based on too fine a measurement. It is impossible to make measurements of the human pelvis within one-tenth of a centimeter. The experience of the author coincides with most of the statements in the literature to the effect that these measurements cannot at the very best be made within one-half a centimeter of variation.

There is, of course, a mass of literature on contracted pelves, taking up all sorts of phases of the subject, which will be omitted, not being an integral part of this consideration, the primary object of which is simply to compare the routine measurements of different nationalities.

Emmons' average measurements for the interspinous and intercristal diameters have been mentioned above. He also worked out a standard deviation and a coefficient of deviation which will be considered later in the present paper. De Souza (1913) analyzed very carefully the work of Emmons and added some observations of his own. He worked out some formulæ for the different measurements which he thinks can be applied with considerable accuracy. The work of Emmons and De Souza was done on dried pelves, though the latter attempted to determine the amount of difference between dried and museum pelves and those in the living. They have not considered extensively the four external measurements which are frequently taken by obstetricians, and have dealt with only two of the external measurements, namely, the interspinous and the intercristal. In so far as these two measurements are concerned, the results will be compared with those of the author later in the discussion. These publications are of considerable importance because of the fact that they are practically the only ones which have analyzed pelvic measurements extensively by more recent mathematical and statistical methods.

The accompanying tables give the average measurements of the four diameters under consideration as quoted for the different races and nationalities by the various authors, including the article of Acosta-Sison and Calderon as well as various others cited in Tables X and XI.

III. MATERIAL

The material consisted of measurements of 329 to 350 French women and 320 American women. The former cases were observed by the author during a short stay in Paris. They belonged to the working class, some of them to the better class of skilled workmen. They were all of the Caucasian race. The Americans all came from Minnesota, were of the white race and were practically all native born. To a considerable extent they were of mixed nationality, mostly from the middle class of professional and business people. There was a considerable percentage of Jewish people, and there were many showing Scandinavian ancestry. There was also a considerable number showing evidence of German, Irish, Scotch, French, and English extraction. Most of them date their ancestry back several generations in the United States.

IV. METHOD OF STUDY

The various measurements of these cases were tabulated and considered by mathematical and statistical methods which are beginning to be applied to medical and surgical subjects. The significance of the terms used and the methods of obtaining the mathematical results will be briefly stated. First, the arithmetical mean or average was obtained by methods very familiar to you all. The maximum and minimum measurements were, of course, easily obtained. The standard deviation was secured by noting the variation of the individual measurement of each case from the average and indicating by the plus or minus sign whether the deviation was greater or less than the average. These individual deviations were squared, the results added and the square root extracted. This result is what is known as the standard deviation and represents an amount of deviation slightly higher than the average.

The amount of probable error was determined by a standard formula which is as follows:

$$\text{Probable error} = \pm\,0.6745 \times \frac{\text{standard deviation}}{\text{square root of number of cases.}}$$

This result indicates half the amount of variation plus or minus which may reasonably be expected to have occurred in the series of cases considered.

The coefficient of variability or deviation was determined by the following formula:

$$\text{Coefficient of variability} = \frac{\text{standard deviation}}{\text{average}} \times 100.$$

TABLE I
PELVIC DIMENSIONS—AMERICAN

(I) EXTERNAL CONJUGATE					(II) INTERSPINOUS		
LENGTH	NO. CASES	PERCENT TOT. NO.	CUMULATIVE I PERCENTAGE	II	LENGTH	NO. CASES	PERCENT TOT. NO.
17	4	1.20	1.20	.93	20	3	.94
18	24	7.50	8.70	2.84	21	6	1.90
19	65	20.30	29.00	12.24	22	30	9.40
20	121	37.80	66.80	26.64	23	45	14.40
21	64	20.00	86.80	43.14	24	53	16.50
22	35	10.90	97.70	65.34	25	71	22.20
23	6	1.80	99.50	81.84	26	53	16.50
24	1	0.31	99.81	93.94	27	39	12.10
				99.54	28	18	5.60
				100.16	29	2	.62
Totals	320	99.81	99.81	100.16		320	100.16

(III) INTERCRISTAL					(IV) INTERTROCHANTERIC		
LENGTH	NO. CASES	PERCENT TOT. NO.	CUMULATIVE III PERCENTAGE	IV	LENGTH	NO. CASES	PERCENT TOT. NO.
24	1	.30	.30	.94	28	3	.94
25	15	4.70	5.00	4.64	29	12	3.70
26	26	8.10	13.10	17.74	30	42	13.10
27	73	22.80	35.90	38.04	31	65	20.30
28	77	24.10	60.00	65.14	32	87	27.10
29	74	23.10	83.10	81.64	33	53	16.50
30	38	11.90	95.00	90.94	34	30	9.30
31	9	2.80	97.80	95.94	35	16	5.00
32	7	2.20	100.00	98.44	36	8	2.50
				99.37	37	3	.93
				99.68	38	1	.31
Totals	320	100.00	100.00	99.68		320	99.68

The result gives in percentage the deviation from the average measurement and is comparable to the standard deviation, the former giving the absolute variation from the average, the latter the percentage variation. It shows the percentage of variability from the arithmetical average.

The coefficient of correlation is determined in a more elaborate manner and represents a comparison of each of the different measurements in pairs. This is accomplished by multiplying together the deviations of each case in the series to be compared. These will fall into two groups of plus and minus. The groups are added separately and the lesser subtracted from the greater (A). This may show a positive or negative correlation, positive meaning that the measurements are correlated in the same direction, negative meaning that they are correlated in opposite directions. The standard deviation of the one group is multiplied by that of the other group. The result is then

multiplied by the number of cases in the series (B). The first sum mentioned above (A) is divided by the product (B) and the result represents the coefficient of correlation. One (1) represents perfect correlation, consequently the nearer the coefficient approaches one (1) the more perfect the correlation between the two sets of figures.

The probable error of the coefficient was also determined. The formula is as follows:

$$\text{Probable error} = \frac{\pm 0.6745 \ (1 - \text{square of coefficient of correlation})}{\text{square root of the number of cases}}$$

The correlation of the different groups was shown by a method of tabulating the data which may require a word of explanation. The tables show the actual number of cases which occur with any measurements in the two series which one desires to compare. It also indicates which measurements in the two series have the largest relative number of cases. The tables also show the total number of cases in either series having a given measurement and the total number of cases in the series.

A general table giving the summary of the data for each measurement of both series was also included. Two other tables, one for each series, were included, giving the data for each individual measurement. The data in these tables served as a basis for working out the percentage curves which give in a graphic form the mathematical data shown in the tables. All curves are based on percentages instead of on the actual number of cases. Individual curves are shown for each measurement of each series. The corresponding curves of each measurement are also superimposed to show more graphically the relationships of the measurements of each series.

V. ANALYSIS OF MATERIAL

Table I is an analysis of the four external pelvic measurements or dimensions of American women. In this table, as in all others, the measurements are designated in centimeters. The number of cases for each measurement is indicated and the percentage of cases with this measurement is shown. The cumulative percentage for each measurement is determined by adding the percentage of each measurement to the total percentage of the shorter measurements. In the totals, the number of cases and the total percentage are shown. This table serves as a basis for working out two types of curves. The first (Figs. 1 and 2) is the percentage frequency curve which shows the percentage number of cases for each measurement. As will be seen from the accompanying figures, these curves rise rather rapidly to their peak and descend in rather a symmetrical manner to the base line. The significance of these curves will be considered later. The second curve based on the cumu-

lative percentage (Figs. 3 and 4) shows the parallelism in percentage of the different measurements of each diameter.

Table II shows the same measurements made of French women. These two tables may be considered comparatively. Certain points are brought out in these tables which show themselves graphically in the corresponding curves. Each measurement will be considered separately and then the measurements as a whole compared (Table III).
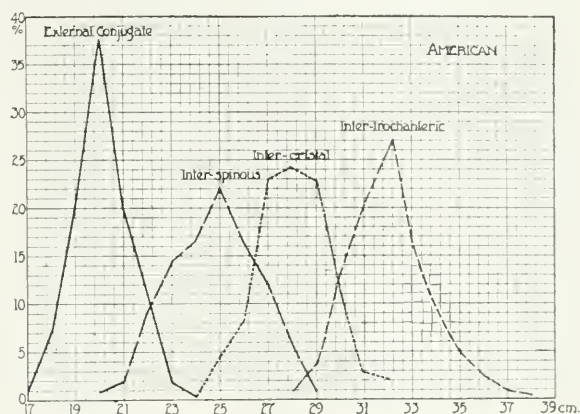
Fig. 1.—Percentage frequency graph. American women. Abscissa shows length of different measurements in centimeters. Ordinate shows their percentage frequency. This is true of all of the figures.
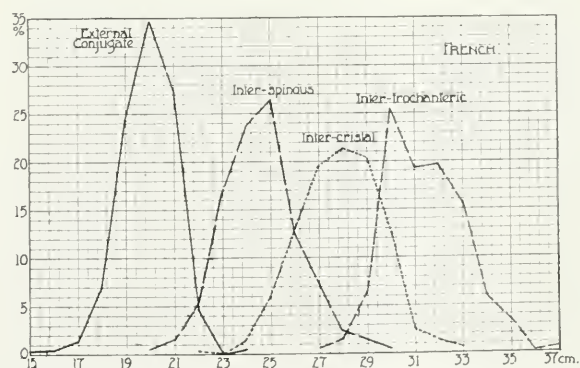
Fig. 2.—Percentage frequency graph. French women.

The external conjugate which is indicated by Roman numeral "I" throughout the discussion was measured 329 times in the French women and 320 times in the American. The maximum of this measurement is the same in both French and American and occurred with equal frequency in each group. The minimum measurement was lower in the French by 2 centimeters. The minimum American measurement occurred with practically the same frequency in the French series. The average French measurement was slightly lower than the American by

about one-third of a centimeter. For practical purposes they may be
considered almost identical. The range of the measurements in the
French was greater than in the American women. The preponderating
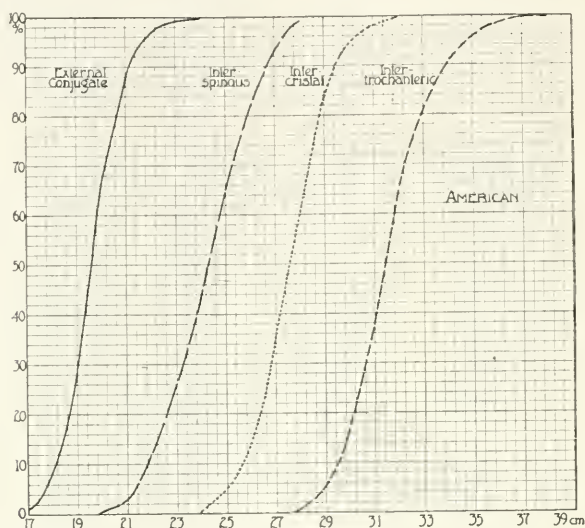
Fig. 3.—Cumulative percentage graph. American women.
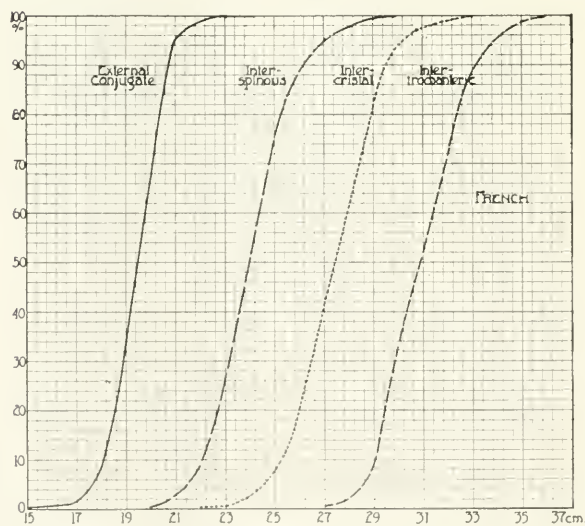
Fig. 4.—Cumulative percentage graph. French women.

measurement or mode (20 centimeters) occurred with greater per-
centage frequency in the American than in the French. This makes a
little higher and a little sharper curve in the American cases. There
is a striking similarity between the American and the French graphs
of this measurement. Both are of the same type and practically of the

TABLE II
PELVIC DIMENSIONS—FRENCH

(I) EXTERNAL CONJUGATE (II) INTERSPINOUS

LENGTH	NO. CASES	PERCENT. TOT. NO.	CUMULATIVE I	PERCENTAGE II	LENGTH	NO. CASES	PERCENT. TOT. NO.
15	1	.30	.30	.57	20	2	.57
16	1	.30	.60	2.28	21	6	1.71
17	4	1.21	1.81	8.85	22	23	6.57
18	22	6.69	8.50	25.71	23	59	16.86
19	80	24.32	32.82	49.42	24	83	23.71
20	114	34.65	67.47	75.70	25	92	26.28
21	90	27.35	94.82	88.56	26	45	12.86
22	16	4.86	99.68	95.70	27	25	7.14
23	0	.00	99.68	97.98	28	8	2.28
24	1	.30	99.98	99.41	29	5	1.43
				99.98	30	2	.57
Totals	329	99.98	99.98	99.98		350	99.98

(III) INTERCRISTAL (IV) INTERTROCHANTERIC

LENGTH	NO. CASES	PERCENT. TOT. NO.	CUMULATIVE III	PERCENTAGE IV	LENGTH	NO. CASES	PERCENT. TOT. NO.
22	1	.28	.28	.86	27	3	.86
23	0	.00	.00	2.58	28	6	1.72
24	6	1.71	1.99	8.88	29	22	6.30
25	21	6.00	7.99	34.38	30	89	25.50
26	46	13.14	21.13	53.58	31	67	19.20
27	68	19.43	40.56	73.35	32	69	19.77
28	74	21.14	61.70	89.11	33	55	15.76
29	72	20.57	82.27	95.13	34	21	6.02
30	44	12.57	94.84	98.85	35	13	3.72
31	10	2.86	97.70	99.14	36	1	.29
32	5	1.43	99.13	100.00	37	3	.86
33	3	.86	99.99				
Totals	350	99.99	99.99	100.00		349	100.00

same symmetry. There is a tendency of the American curve to be slightly to the right, indicating a little larger dimension. These curves are all plotted, as is apparent, with the centimeter measurement as the abscissa and the percentage as the ordinate.

The interspinous, indicated by Roman numeral "II," was measured 350 times in the French and 320 times in the American women. The maximum measurement was 30 in the French and 29 in the American. The maximum American measurement occurred with less frequency in the American than in the French. The minimum measurement was the same in both series, occurring, however, with less frequency in the French. The average measurement or mean was nearly one-half centimeter greater in the American than in the French. The most frequent measurement or mode (25 centimeters) was the same in both

TABLE III

MEASUREMENTS	I EXTERNAL CONJUGATE			II INTERSPINOUS			III INTERCRISTAL			IV INTERTROCHAN-TERIC		
	LGT CM	CASES	%	LGT CM	CASES	%	LGT CM	CASES	%	LGT CM	CASES	%
Minimum American	17	4	1 2	20	3	0 94	24	1	0 3	28	3	0.94
French	15	1	0 3	20	2	0.57	22	1	0.28	27	3	0.86
Maximum American	24	1	0 3	29	2	0 62	32	7	2.2	38	1	0 31
French	24	1	0.3	30	2	0.57	33	3	0.86	37	3	0.86
	CM			CM			CM			CM		
Average American	20.26			24 94			28 31			32.19		
French	19.94			24.55			27.82			31.41		
	CM			CM			CM			CM		
Probable Error American	± 0 04			± 0 07			± 0 06			± 0.06		
French	± 0.04			± 0.06			± 0 06			± 0.06		
	CM			CM			CM			CM		
Standard Deviation American	1 14			1 80			1.49			1 70		
French	1.12			1.65			1.74			1.72		
Coefficient of Variability American	5 6%			7.2%			5 2%			5 3%		
French	5 6%			6 7%			6.2%			5.5%		

Coefficient of Correlation	I & II	I & III	I & IV	II & III	II & IV	III & IV
American	+0 31	+0 41	+0 56	+0.65	+0 46	+0 61
French	+0.64	+0 67	+0.71	+0.85	+0.77	+0 79
Probable Error of Coefficient of Correlation American	± .034	± .031	± .026	± .021	± .029	± .023
French	± .022	± .020	± .018	± .010	± .014	± .013

series. It occurred with greater frequency, however, in the French women. This would make the French curve have a higher peak. Both curves were fairly similar, the American showing more symmetry than the French. The American curve was also slightly further to the right than the French, showing a somewhat larger measurement when taken as a whole. The French curve shows greater variability. The range in the French is somewhat greater on the side of the maximum measurement.

The intercristal, indicated by Roman numeral "III," was measured 350 times in the French and 320 times in the American women. The maximum measurement was greater in the French by 1 centimeter. The minimum measurement was less in the French by 2 centimeters. The minimum American measurement occurred with less frequency

TABLE IV
EXTERNAL CONJUGATE (I)

INTERSPINOUS (II)

MEASURE-MENT	15	16	17	18	19	20	21	22	23	24	NO. OF CASES
20					(1) 1	(1) 2					(2) 3
21			(2) 1		(1) 1	(2) 4	(1)				(6) 6
22			(1)	(1) 6	(10) 9	(6) 10	(3) 5				(21) 30
23		(1)	(1) 1	(5) 3	(23) 13	(17) 18	(11) 8	2			(58) 45
24	(1)			(9) 3	(15) 8	(32) 24	(23) 13	(2) 4	1		(82) 53
25			1	(3) 3	(23) 21	(35) 30	(19) 8	(9) 6	2		(89) 71
26			1	(3) 5	(6) 7	(12) 18	(21) 14	(2) 7	1		(44) 53
27				(1) 3	5	(9) 12	(8) 9	8	1	1	(18) 39
28				1	(1)	3	(3) 6	(1) 7	1		(5) 18
29							(1) 1	(2) 1		(1)	(4) 2
	(1)	(1)	(4) 4	(22) 24	(80) 65	(114) 121	(90) 64	(16) 35	(0) 6	(1) 1	(329) 320

Figures in circles—French.
Black—American.

in the American than in the French. The maximum American measurement occurred with greater frequency in the American than in the French. The mode was the same for both and occurred in greater percentage in the American than in the French. The curves made for the two groups show a peculiar form of striking similarity, being unlike the curves of any of the other measurements. Both are fairly symmetrical. Both are definitely truncated, indicating a larger modal class. The American curve has a narrower base, being somewhat narrower and higher. In the main, it is a trifle more to the right than the French curve, indicating a generally larger pelvis which is also indicated by the mean which is about one-half centimeter greater in the American than in the French. The range of the measurements is definitely greater in the French by 1 centimeter on the side of the maximum and 2 centimeters on that of the minimum measurement.

The intertrochanteric, indicated by Roman numeral "IV," was measured in 349 cases in the French and 320 cases in the American

women. The maximum measurement is less in the French than in the American by 1 centimeter. The minimum is less in the French than in the American also by 1 centimeter. The maximum measurement of the French series occurs with practically the same frequency in the American. The minimum measurement of the American occurs with greater frequency in the French than in the American. The average measurement is greater in the American than in the French women by
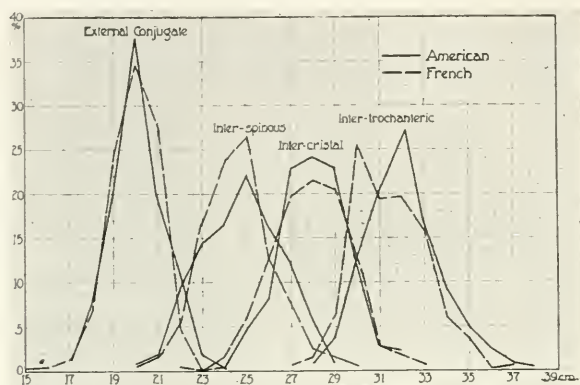
Fig. 5.—Comparison of pelves of French and American women. Percentage frequency graphs.
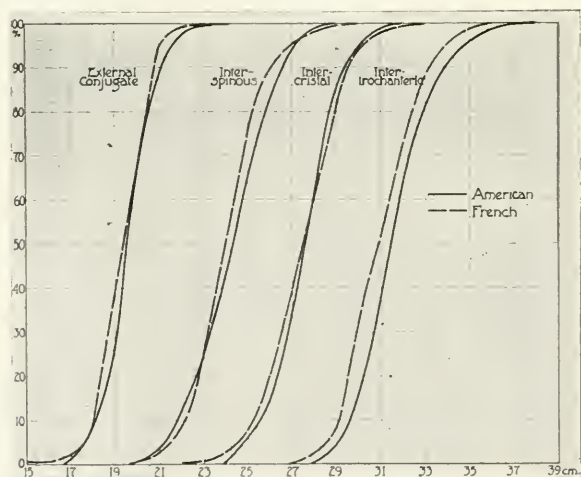
Fig. 6. Comparison of pelves of French and American women. Cumulative percentage graphs.

about three-fourths of a centimeter. The mode is 32 centimeters in the American and 30 centimeters in the French. Both graphs have a base of practically the same dimensions. The American curve is quite symmetrical while that of the French shows a rather marked asymmetry or skewness. Both are of about the same height. The American graph as well as its apex is a little further to the right.

Table III is a summary of the data worked out for the different

TABLE V
EXTERNAL CONJUGATE (I)

	15	16	17	18	19	20	21	22	23	24	NO. OF CASES
MEASUREMENT											
22					(1)						(1) / 0
23											(0̄) / 0
24			(3)		(2) / 1	(1)					(6) / 1
25				2	(1) / 1	(9) / 8	(6) / 3	(3) / 1			(19) / 15
26	(1)	(1)	(1)	(8) / 6	(16) / 8	(13) / 11	(6) / 1				(46) / 26
27				(7) / 5	(21) / 15	(26) / 34	(12) / 17	(2) / 2			(68) / 73
28			2	(4) / 6	(21) / 19	(27) / 31	(18) / 10	(3) / 9	1		(73) / 78
29				(1) / 4	(7) / 14	(32) / 27	(26) / 16	(1) / 9	3		(67) / 73
30				(1) / 2	(3)	(8) / 13	(20) / 12	(8) / 8	2	1	(40) / 38
31						(1) / 1	(4) / 4	(1) / 4			(6) / 9
32						1	(1) / 3	3		(1)	(2) / 7
33								(1)			(1) / 0
	(1) / 0	(1) / 0	(4) / 4	(22) / 24	(80) / 65	(114) / 121	(90) / 64	(16) / 35	(0̄) / 6	(1) / 1	(329) / 320

INTERCRISTAL (III)

Figures in circles—French.
Black—American.

groups of cases. It shows the maximum and minimum measurements, the number of instances and the percentage with which each one of these occurs in the different series. The average measurement is also shown for each group of cases. The probable error in centimeters for this measurement was worked out according to the formula given earlier in the paper. As will be seen, the probable error is very low.

The standard deviation was determined as already mentioned. The standard deviation for the external conjugate was slightly greater in the American than in the French. The deviation of this measurement in the two groups may be regarded as practically the same. The deviation of the interspinous measurement was somewhat greater in the American than in the French. The deviation of the intercristal was

TABLE VI
EXTERNAL CONJUGATE (I)

INTERTROCHANTERIC (IV)

MEASURE-MENTS	15	16	17	18	19	20	21	22	23	24	NO. OF CASES
27			(1)		(1)		(1)				(3)
28			(1)	1	(3)	(1) 2					(5) 3
29			(1) 1	(8) 3	(8) 6	(2) 2	(2)	(1)			(22) 12
30		(1)	(1)	(7) 9	(34) 13	(33) 16	(13) 4				(89) 42
31	(1)		2	(3) 7	(20) 11	(28) 30	(14) 11	(1) 4			(67) 65
32			1	(3) 1	(9) 24	(31) 38	(20) 18	(5) 5			(68) 87
33				(1) 3	(4) 8	(15) 23	(28) 13	(3) 4	2		(51) 53
34					2	(3) 6	(9) 12	(4) 8	2		(16) 30
35					1	(1) 3	(3) 5	(2) 7		(1)	(7) 16
36						1		5	1	1	(0) 8
37							1	1	1		(0) 3
38								1			0 1
	(1)	(1)	(4) 4	(22) 24	(79) 65	(114) 121	(90) 64	(16) 35	6	(1) 1	(328) 320

Figures in circles—French.
Black—American.

greater in the French women than in the American. The deviation of the intertrochanteric was practically the same for both French and American women. In both groups, the deviation from the average was the least for the external conjugate measurement. In the American, the intercristal was next in order showing the least deviation. Then followed the intertrochanteric, and the interspinous with the greatest deviation. In the French group, the interspinous was followed by the intertrochanteric and the intercristal in progressively greater deviations from the average.

The coefficient of variability was determined as stated above and was fairly low. It was the same for the external conjugate in both French and American women and practically the same for the inter-

TABLE VII
INTERSPINOUS (II)

INTERCRISTAL (III)

MEASURE-MENT	20	21	22	23	24	25	26	27	28	29	30	NO. OF CASES
22	(1)											(1) 0
23												(0) 0
24	1	(3)	(2)									(5) 1
25		(3) 2	(7) 5	(11) 5	1	2						(21) 15
26		3	(7) 9	(21) 12	(18) 1	(1) 1						(47) 26
27	2	1	(5) 10	(17) 18	(32) 19	(11) 15	(2) 7			1		(67) 73
28			(2) 4	(8) 9	(13) 20	(44) 30	(7) 10	(1) 4				(75) 77
29			(1) 2	(2) 1	(14) 9	(24) 18	(22) 28	(9) 15	1			(72) 74
30					(4) 3	(13) 4	(11) 7	(11) 16	(4) 8	(1)		(44) 38
31					(1)		(2) 1	(3) 1	(2) 6	(2) 1		(10) 9
32						1	(1)	(1) 3	(2) 3	(1)		(5) 7
33											2	2 0
	(1) 3	(6) 6	(24) 30	(59) 45	(82) 53	(93) 71	(45) 53	(25) 39	(8) 18	(4) 2	(2)	(349) 320

Figures in circles—French.
Black—American.

trochanteric, being slightly greater in the French series. The percentage variability for the interspinous was greater by about 0.5 per cent in the American than in the French women. The intercristal shows a greater percentage variability by about 1 per cent in the French than in the Americans.

The correlation was worked out for all possible combinations of two measurements in each of the two groups. One (1) represents perfect correlation. In every instance in these series, the correlation was positive. The correlation between the external conjugate and the interspinous measurements was much more marked in the French than in the American cases. This was also true for all other correlations in the two groups. In the American series, the highest correlation oc-

TABLE VIII
INTERSPINOUS (II)

INTERTROCHANTERIC (IV)

MEASURE-MENTS	20	21	22	23	24	25	26	27	28	29	30	NO. OF CASES
27		(1)		(2)								(3) / 0
28		(1)	(2) / 1	(1) / 1	(2)	1						(6) / 3
29		(2) / 2	(2) / 5	(5) / 2	(5)	(6) / 3	(1)	(1)				(22) / 12
30	(2) / 2	(1) / 2	(12) / 3	(29) / 9	(26) / 9	(12) / 8	(7) / 8	1				(89) / 42
31	1	(1) / 1	(3) / 9	(13) / 12	(20) / 9	(21) / 18	(5) / 10	(3) / 5	(1)			(67) / 65
32		1	(4) / 7	(4) / 13	(15) / 17	(29) / 21	(13) / 17	(4) / 9	2			(69) / 87
33			4	(4) / 6	(11) / 11	(15) / 9	(15) / 8	(7) / 9	(3) / 5	1		(55) / 53
34			1	2	(3) / 5	(4) / 6	(3) / 7	(8) / 6	(2) / 3	(1)		(21) / 30
35				2		(5) / 4	(1) / 2	4	(2) / 3	(4) / 1	(1)	(13) / 16
36					1			4	3	(1)		(1) / 8
37					(1)		1	(2) / 1	1			(3) / 3
38									1			(0) / 1
	(2) / 3	(6) / 6	(23) / 30	(55) / 45	(83) / 53	(92) / 71	(45) / 53	(25) / 39	(8) / 18	(5) / 2	(2)	(349) / 320

Figures in circles—French.
Black—American.

curred between the interspinous and the intercristal, the lowest between the external conjugate and the interspinous. In the French, the highest correlation was also between the interspinous and the intercristal, and the lowest between the external conjugate and the interspinous. In general in both series, the correlations between the external conjugate and any other measurement were less than those of any of the other measurements.

The probable error of the coefficient of correlation was determined for each coefficient. It was greater in the American than in the French series, but was relatively small for all of the different correlations.

Tables IV to IX inclusive show in tabular form the correlation between every pair of measurements in the two series. The figures of

Table IX
Intercristal (III)

INTERTROCHANTERIC (IV)

MEASURE-MENT	22	23	24	25	26	27	28	29	30	31	32	33	NO. OF CASES
27			(1)	(2)									(3) 0
28			(2)	(1)	(2) 2	(1) 1							(6) 3
29			(2)	(4) 6	(6) 4	(5) 2	(5)						(22) 12
30	(1)		(1) 1	(9) 1	(22) 10	(32) 15	(15) 6	(9) 8	1				(89) 42
31				(2) 3	(13) 4	(18) 24	(20) 24	(11) 9	(3) 1				(67) 65
32				(1) 5	(3) 3	(7) 24	(25) 26	(23) 23	(9) 6		(1)		(69) 87
33				(1)	3	(4) 5	(8) 15	(22) 18	(16) 12	(1)			(55) 53
34						2	4	(4) 9	(11) 10	(5) 3	(1) 2		(21) 30
35						(1)	(1) 2	(2) 5	(3) 3	(1) 3	(3) 3	(2)	(13) 16
36								2	3	2	1	(1)	(1) 8
37								(1)	(2) 1	1	1		(3) 3
38									1				(0̄) 1
	(1)		(6) 1	(20) 15	(46) 26	(68) 73	(74) 77	(72) 74	(44) 38	(10) 9	(5) 7	(3)	(349) 320

Figures in circles—French.
Black—American.

the American cases are shown in plain type, those of the French are shown in a circle. By these tables it is possible to tell the total number of cases in the series, the number of cases in either series having a given measurement, also the number of cases occurring with any pair of measurements in the correlated groups. These tables show a certain amount of positive correlation which is also indicated in the table by the coefficient of correlation. The amount of correlation for the different groups may be seen by the manner in which the bulk of the cases is grouped.

In general it may be said that the French pelves are smaller than the American. They show a greater range as between the maximum and minimum, while their average measurement is somewhat less.

TABLE X

AVERAGE PELVIC MEASUREMENTS OF THE LIVING SUBJECTS FOR THE VARIOUS RACES AND NATIONALITIES

CAUCASIAN RACE

WHITE AMERICAN

	GRANDIN AND JARMAN	CRAGIN	RIGGS	EDGAR	WILLIAMS	HUNTINGTON	ADAIR
Ext. conjugate	20	20	19.71	20.25	21	20.7	20.26
Interspinous	25–25.5	26	25.47	25.5	26	26.4	24.94
Intercristal	26–27.5	28	28.00	28.0	29	28.2	28.31
Intertrochanteric	30–30.5	....	30.90	31.0	32	....	32.19

CAUCASIAN RACE

	ENGLISH	GERMAN					
	BERKELEY AND BONNEY	BUMM	WINTERNITZ	BAISCH	DÖDERLEIN	RUNGE	AHLFELD
Ext. conjugate	....	18-20	20	20-22	20	20	19.5-20
Interspinous	25.5	26	25-26	25	25-26	26	24
Intercristal	27.5	29	28-29	28	28-29	29	28
Intertrochanteric	....	31	....	31	31-32	31.5	....

CAUCASIAN RACE					OTHER RACES	
	IRISH	SCOTCH	FRENCH		JEW	FILIPINA	NEGRO
	TWEEDY	JOHNSTONE	ADAIR	CAZEAUX AND TARNIER	JEWETT	ACOSTA-SISON AND CALDERON	RIGGS
Ext. conjugate	21.0	18.75	19.94	18.75	20.0	17.64	19.32
Interspinous	26.0	23.75–25	24.55	23.75	26.5	23.71	23.99
Intercristal	29.0	26.5–27.5	27.82	26.25	28.0	25.29	26.0
Intertrochanteric	....	30.0	31.41	....	....	27.55	30.09

The deviation from the average is on the whole less in the French than in the American women. The variability of the different measurements in both the French and the American is remarkably close, being low in both groups.

The coefficient of correlation was much higher in the French than in the American. A comparison of these coefficients of variability and correlation with those of other anatomical measurements as determined by various authors shows the deviations to be relatively small and the correlations to be relatively high in most instances. The following data is taken from Davenport's Statistical Methods. Warren

is quoted as giving the coefficient of variability of the limb bones of French and Naquada skeletons as 4.68 to 5.57 per cent; Rollet as stating that the coefficient of correlation between the right and left femur
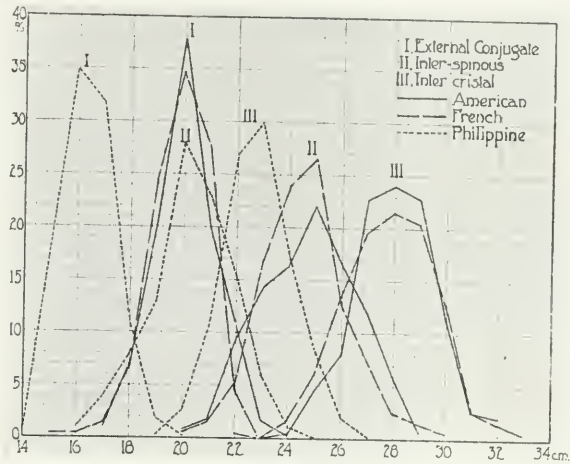
Fig. 7.—Comparison of pelves of French, American, and Philippine women. Percentage frequency graphs.
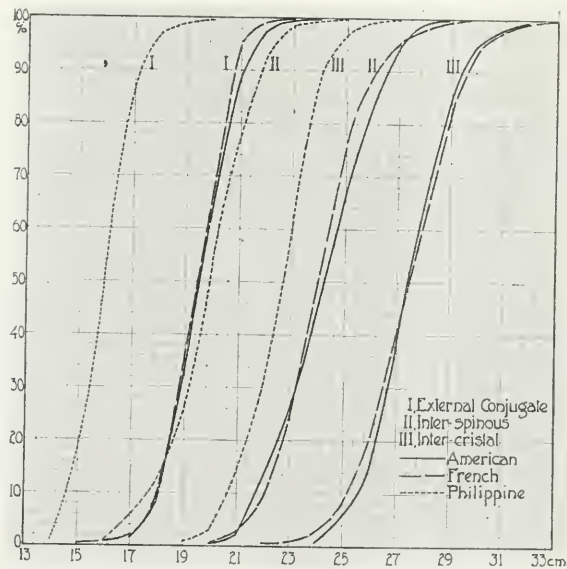
Fig. 8.—Comparison of pelves of French, American and Philippine women. Cumulative percentage graphs.

is 0.96, that between the femur and humerus is 0.84, that between the clavicle and scapula is 0.12, and that between the humerus and radius is 0.74.

In order to compare the present study with that of Acosta-Sison and

TABLE XI

PELVIC MEASUREMENTS OF DRY PELVES FOR VARIOUS RACES AND NATIONALITIES

	AMERICAN INDIAN	BUSHMAN	AUSTRALIAN	JAVANESE	PERUVIANS	MEXICANS
	EMMONS	VROLICK	LE VERNEAU	VROLICK	LE VERNEAU	
Interspinous	22.6	17.0	18.2	20.2	21.7	18.0
Intercristal	25.7	21.5	23.7	21.8	25.4	22.1

	ARYAN(?)	CHINESE		EGYPTIAN	EUROPEAN	BENGALESE	NEW CALEDONIA
	JOULIN	JOULIN	LE VERNEAU	LE VERNEAU			
Interspinous	26.0	20.5	22.6	22.4	22.2	17.9	20.4
Intercristal	27.0	22.0	25.2	26.2	26.6	21.6	26.2

	NEGROES OF VARIOUS PROVINCES						
	VROLICK	JOULIN	LE VERNEAU				
Interspinous	19.1	21.2	21.7	17.4	17.7	20.5	20.3
Intercristal	21.4	23.4	26.9	22.8	22.0	25.9	24.8

Calderon, their curves were studied and reduced as accurately as possible to the mathematical status of the French and American pelves, and curves of this information were plotted and compared with the pelvic curves of the French and American women. These curves are shown in Figs. 7 and 8. They had only three measurements which could be compared, namely, the external conjugate, interspinous, and intercristal. These curves are somewhat different from either the French or the American. The difference is especially noticeable for the intercristal diameter. The location of all of the curves is to the left, indicating a much smaller type of pelvis. The maximum and minimum as well as the average measurements are much lower for the Filipina pelvis than either the French or the American. It is evident from these curves that the Filipina pelvis does not conform to the usual type of either the French or the American pelvis. It would be very interesting to plot the curves of the negro pelvis for comparison with the French, American and Filipina pelves, but unfortunately a series of individual measurements of negroes was not available to the author. We have so few negroes in our section of the country that it would be almost impossible to secure a series of these measurements.

A simple device for determining whether or not a given pelvis conforms to type has suggested itself to the author. It consists of a simple

centimeter scale with movable slides which can be placed at the points which correspond to the measurements in the individual case. This scale is then placed on the ordinate paper which is ruled on the centimeter scale. The points where the measurements fall on the four cumulative percentage curves can be easily noted. In this manner it can easily be seen whether or not a given pelvis conforms to the usual or average. This method could be used not only for external measurements, but for similar curves plotted on any pelvic measurements, for instance, those of the pelvic outlet.

VI. SUMMARY

1. French and American pelves show the same general external form.

2. The French pelves are in the main slightly smaller than the American. The average external measurements of the French are uniformly smaller than the American.

3. The range of variations of external measurements is generally somewhat greater in the French than in the American.

4. The standard deviation is about the same for the French and the American pelves, some measurements showing slightly more in the American, others a slightly greater deviation in the French.

5. The coefficient of variability is quite low and is about the same for both groups.

6. The correlation of the different measurements is definitely lower in the American than in the French pelves. The same measurements, however, show about the same order of correlation in both series, the lowest correlation being between the external conjugate and the interspinous, and the highest between the interspinous and the intercristal.

VII. CONCLUSIONS

1. The author appreciates fully the limitations of external pelvimetry, but also feels that the value of this method of examination may be increased by better methods of statistical study.

2. The racial and national pelvic differences should be more carefully studied and recorded so that observations made and conclusions drawn in one section of the world may not be applied too arbitrarily in other sections.

3. There are apparently definite pelvic differences, not only in different races, but in different nationalities. This was indicated by the earlier work of Le Verneau and Vrolick. It is shown definitely by the work of Williams and his associates in comparing the pelvis of the negro with that of the white, by the studies of Emmons and De Souza, also by those of Acosta-Sison and Calderon. The present study also shows less marked, but none the less definite, indications of national

as well as racial pelvic differences which are apparent even on external examination of the living subject.

4. It is, of course, obvious that much more accurate deductions could be drawn by more complete and extensive pelvic measurements. The author regrets that he has been unable to make these comparisons, but the conditions under which the work was done made it none too easy to secure even the measurements which were obtained.

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La Salle Building.

ACUTE MALIGNANT ENDOCARDITIS COMPLICATING PREGNANCY*

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MRS. B., age thirty, ii para, seen in consultation with Dr. Malcolm Campbell of Malvern, Iowa, was seemingly in perfect health until early in her third pregnancy when she suffered from pains in ankles, hips and shoulder joints which her family physician diagnosed as rheumatic arthritis. The tonsils and teeth were not involved but the nasal passages were occluded with mucopurulent secretions and incrustations which persisted and prevented her from breathing through the nose. This was the only focal infection discerned. She rapidly lost flesh and strength and became extremely anemic and nervous. There were repeated chills with an irregular course of fever ranging to 104°F. Shortness of breath and palpitation of the heart are recorded as early symptoms. The aortic and mitral valves were early involved and later the tricuspids as well. Blood cultures were taken and the Streptococcus viridans found. Precordial friction sounds were observed as a late development. The urinary findings were negative until near the end when the urine presented the usual findings of an acute nephritis and this was associated with

uremic symptoms. Death was preceded by coma and convulsions. About three weeks before her death she was seen by a competent internist, Dr. W. O. Bridges. She was then pregnant about 16 weeks. Dr. Bridges advised the interruption of pregnancy which I accomplished by infiltrating the cervix with 1 per cent novocain solution. followed by a Dührrsen bilateral incision. No depression followed the operation, the patient seemed to improve for two weeks when the kidneys became acutely involved and a week later she died in uremic convulsions and coma.

For practical purposes acute endocarditis is classified as simple and septic (malignant). These types probably represent varying degrees of the same morbid process according to the virulence of the micro-organisms and the resistance of the tissues. The clinical phenomena and anatomic changes do not differ essentially in the various etiologic forms. The septic type is of special interest to the obstetrician in that it is not infrequently found in association with puerperal infections. Clinically the septic form of acute endocarditis is distinguished from the simple type by the occurrence of chills, irregular course of fever and the appearance of multiple emboli. Malignant endocarditis is always of bacterial origin and should be regarded as a local complication of a general infection.

Because of the fairly frequent association of acute malignant endocarditis with puerperal infections we find this type of cardiac lesion twice as frequent in women as in men. According to Lenhartz, 21 per cent of all cases of septic endocarditis are of genital origin. It is rare that any other than the puerperal form of genital infection is complicated by septic endocarditis. Of the etiologic factors, the streptococcus ranks first in point of frequency and virulence, the staphylococcus second and the pneumococcus, meningococcus, diphtheria bacillus and colon bacillus are occasional factors. The gonococcus is a rare finding but has been known to be rapidly fatal; such cases have been reported by Külbs, Finger, Ghon, Schlagenhaufer, Taylor, Thayer, Sternberg, von Leyden, Lenhartz and von Dabney.

The septic or malignant type of acute endocarditis is usually ushered in by repeated chills, followed by an irregular fever and sweating, the temperature is commonly of a remittent type, the pulse is accelerated and feeble, the respirations rapid and superficial and associated with the above symptoms there is usually extreme nervousness, even delirium, vomiting, tympanites, diarrhea and a gradual failure of strength. These are manifestations of a general septic condition. Later metastatic abscesses may appear in various parts of the body. Heart murmurs may or may not appear and are not evidence *per se* of a septic type of endocarditis. They may be absent in the septic type and are common to the simple forms. The entire course of the disease rarely extends beyond two weeks and the results are almost invariably fatal.

The so-called "septic type" is common to acute malignant endocarditis in connection with puerperal sepsis. In this form the heart symptoms may be masked by those of general sepsis and the first intimation of the involvement of the heart may be the appearance of emboli.

All authorities agree with Fritsch that the malignant type is commonly engrafted upon previously diseased valves. While admitting possible recoveries, Osler has never seen a case that did not prove fatal. The only excuse for bringing this case report before the Society is the very unusual occurrence of acute malignant endocarditis in the course of an otherwise normal pregnancy. Croom found no more than six cases in the literature to 1906.

670 BRANDEIS THEATRE BUILDING.

OBSERVATIONS ON ECTOPIC PREGNANCIES*

FROM A STUDY OF 307 CASES

BY JOHN OSBORN POLAK, M. SC., M.D., F.A.C.S., BROOKLYN, N. Y.

THE subject of ectopic presents so little that is new, yet the mistakes in diagnosis seem to be relatively more frequent than a review of the cases which furnish the data for this paper would seem to justify. This therefore is my excuse for presenting this paper.

I believe that it is possible to make the diagnosis of ectopic before the tragic stage if proper credence is given to the history, symptoms, and physical signs; for the majority of ectopics present a symptom-complex that is definitely characteristic and which has a direct relation to the pathologic changes in the tube and the adjacent peritoneum.

The data which I am about to present have been drawn from a review of the case records, physical signs, and operative or autopsy findings of 307 cases of ectopic gestation which have occurred in my services in the Long Island College Hospital, Jewish, Methodist Episcopal and Williamsburgh Hospitals in Brooklyn. Of this number three have had full-term abdominal pregnancies as a result of ruptured tubal gestations occurring early in the course of pregnancy; and five have terminated in the secondary rupture of an intraligamentous pregnancy at the third, fourth, and fifth months, respectively. The remaining 299 cases ruptured or aborted before the twelfth week.

These anomalous pregnancies have occurred in three distinct groups of patients:

1. In women with a previous history of a definite pelvic infection following marriage, intrauterine instrumentation, abortion, or child-

birth, or of an intraabdominal operation followed by peritonitis with an intervening period of sterility, which has allowed sufficient time for the partial recuperation of the tubes. (One hundred eighty-six fell in this group.)

2. In women presenting a history of dysmenorrhea from the first occurrence of their menstrual function, and who on examination have shown many developmental defects or hypoplasias, including funnel pelvis, infantile uterus, narrow vagina, and who have remained sterile after marriage for varying periods and finally following some procedure for the cure of their sterility, have developed an ectopic. Such was the history of seven women who were the subjects of repeated ectopics. (Ninety-four fell in this class.)

3. The final group was found in women notably of Jewish, Irish, or Italian birth, who have had repeated intrauterine pregnancies ending in abortion or going to full term, and who without any explainable cause developed an ectopic. (Twenty-seven are included in this group.)

In this study which is based on our operative or autopsy observations, (1) Unruptured cases with but slight hemorrhage into the decidua were noted 39 times. (2) Tubal abortion, or where there was separation of the ovum from its decidual bed by bleeding into the decidua, was recorded in 199 cases. (3) Actual tubal rupture occurred but 61 times. In 18 instances this rupture was into the peritoneum with varying amount of intraabdominal hemorrhage, into the broad ligament with the formation of varying sized hematoma 43 times.

The location of the ectopic gestation sac is of considerable interest. This was found to be in:

The interstitial portion of the tube	6 cases
The isthmic portion of the tube, ...	79 "
The ampulla and free portion, ...	203 "
The stump of a previously amputated tube, ...	3 "
An angulation of the tube caused by a previous Gilliam or Baldy-Webster operation	8 "
	299 total

Our experience has shown that clinically all ectopies fall into one of two general classes: (1) Those which may be classed as in the non-tragic stage, with a pulse distinctly countable of 100 or under with a systolic pressure of 100 or over and a hemoglobin of 60 per cent or more. In this class there were 263 cases. (2) And those in the tragic stage pulseless at the wrist, with a blood pressure below 90, a hemoglobin under 50 and definite signs of internal hemorrhage and collapse. In this class there were 36 cases.

Blood was noted in the abdominal cavity in all, whether the tube was

ruptured or unruptured. The majority had free blood of varying amount—3 had infected hematoceles, 296 were operated, 3 died before operation could be done. Among the 296 ectopics operated, 7 died.

The mortality was as follows: 1 on the table from hemorrhage; 1 two hours following the operation from shock and hemorrhage; 5 from peritonitis.

From this study several points of interest have been deduced: First, that the history is of the most important diagnostic value. We believe that in no condition is the history of such suggestive value as in ectopic; for when the fecundated ovum is arrested in its transit through the tube, a makeshift decidua not thick enough to harbor the ovum and protect the underlying muscle and venous radicals from the erosive action of the trophoblastic cells is developed. It is not a true decidua as is found in the uterus, but a decidual reaction seen throughout the mucous membrane of the tube as isolated cells or groups of cells. It is largely because of this inefficiency of this decidual layer, that we get our suggestive history and the characterization signs and symptoms.

Fecundation of the ovum produces the amenorrhea but because of the erosive action of the syncytial cells, the ovum which tries to erode itself into the basic decidua which is imperfectly developed, riddles the muscle and penetrates the venous radicals with resulting hemorrhage into the decidua. This in turn tends to unseat the ovum, overdistends the tube, and causes the pain and bleeding. The syncytial cells erode into the small venous radicals of the muscle coat because the decidua is too thin to protect the deeper layers. This occasions numerous small hemorrhages into the decidua and into the muscle fibers of the tubal wall, distends the tube, partially dislodges the ovum, and causes ovular unrest which, in turn, causes the clinical symptom of colicky pains in the region of the fruit sac.

Inasmuch as the uterus and tubes are genetically identical, composed of the same tissues, this unrest or peristaltic wave is transmitted to the uterus and there are uterine contractions with slight bleeding from the endometrium. This blood mixed as it is with the secretion from the hypertrophied utricular glands produces the characteristic bloody discharge which does not clot; which is a familiar diagnostic sign. Two hundred and twenty-seven women gave a definite history of anomalous uterine bleeding, appearing either as prolonged menstruation or as a metrorrhagia after a varying period of amenorrhea.

The effusion of blood into the decidua which results from the progressive erosion of the ovum, also finds its way into the lumen of the tube, distends it, and leaks out through the abdominal ostium into the peritoneal cavity. This gravitation of blood is further favored by the

prolapse of the tube which because of its increased weight falls naturally into the culdesac.

This peritoneal reaction explains the occurrence of four symptoms. (1) The slight elevation of temperature which was present in 80 per cent of all the cases which were observed for several days prior to making the final diagnosis. (2) A moderate leucocytosis. (3) The exquisite sensitiveness of the cervix to motion which was never absent in this series in any physical examination. (4) Pain on defecation as the hard fecal mass passes between the sensitive uterosacral ligaments. This is especially noticeable in left-sided tubal pregnancies.

With this brief reference to the pathology it will be seen that the following points may be elicited in the history of the great majority of cases of unruptured pregnancy:

(a) Ectopic pregnancy occurs most frequently where there is a congenital anomaly or a previous inflammation of the tube; in the woman who gives a history of premenstrual dysmenorrhea.

(b) And like other pregnancies, there is either a period of amenorrhea or an attempt at menstrual suppression; but because of the unstable position of the ovum owing to the imperfectly developed tubal decidua and erosion of the ovum into the underlying muscle and venous radicals, bleeding takes place into the decidua and produces such ovular unrest as to cause tubal distention and peristalsis which is evidenced by colicky pains and uterine bleeding.

(c) The bleeding into the decidua plus the growing ovum distends the tube and causes the soreness and tenderness over the region of the distended gestation sac.

The relation of the physical signs to the pathology is still more striking and constant as was shown by our study of this series.

The uterus is enlarged, because it contains a decidua which was prepared in anticipation for the reception of the ovum. This sign could be definitely demonstrated in all of the ectopic pregnancies of eight weeks or over. The cervix is soft, due to the congestion consequent upon pregnancy. This symptom is variable and is of no diagnostic importance. It was noted in a very few of our cases. On bimanual examination the uterus does not have the characteristic diagnostic sign of pregnancy, i.e., the elasticity of the median portion of its anterior wall and the compressibility of its isthmus. The absence of these changes in consistency is due to the absence of the growing ovum in the uterus, which, though it is enlarged, is not changed in shape or consistency except for the slight softening of the cervix which is not constantly present. The cervix is exquisitely sensitive to motion. This is shown by palpation and is due to the peritoneal irritation from the blood which gravitates from the end of the tube or through the tubal wall because of its porosity and finally to the prolapse of the

tubal mass into the culdesac. This reaction of the peritoneum cover-
ing the uterosacral ligaments makes them sensitive; hence anything
which moves these sensitive bands will cause exquisite pain. This
sign, pain on movement of the cervix, was present in all of our cases.

The pulsation of the uterine artery is more apparent on the side
where we find the gestation sac. This sign was particularly noticeable
after intraligamentous rupture, for naturally, the blood supply is in-
creased on the side of the pregnancy and the caliber of the vessel is
enlarged, hence because of the tendency of the pregnant tube to drop
into either the posterior or posterior-lateral culdesac, the artery is
depressed and is brought more within the reach of the finger than is
the case in a normal pregnancy.

The uterus is displaced because the tubal tumor owing to its weight
has fallen into the lateral, or the posterior, or the anterior culdesac.
Naturally the greater the bulk of the tumor, the greater the displacement
of the uterus; obviously the uterine displacement is less apparent in
early unruptured ectopics with little blood accumulation in the
culdesac.

The tumor displacing the uterus has certain definite characteristics;
it is of rapid growth. This increase in size is not alone due to the
growth of the ovum, but to the extravasation of blood which takes
place into the muscle and decidua in the tube and thus increases
the size of the gross mass. It is exquisitely sensitive because the
tubal covering is stretched to its utmost. It is fluctuant, for the
contents of the ovum and the contained blood are fluid. Hence all of
the physical signs have an intimate relation to the actual pathology
which is taking place within the tube, owing to the erosion of the
growing ovum into an incompletely developed decidua.

When rupture or tubal abortion occurs there is sudden pain. This
pain is due to the erosion through the tubal wall and escape of the
ovum, or to the expulsion of the ovum from the ampulla. The expul-
sion is not alone due to peristalsis, but to the formation of blood clots
within the tube. The peritoneum immediately reacts and there are
signs of an intraabdominal calamity, namely, abdominal pain and
shock of greater or less degree. If hemorrhage is inconsiderable the
patient will react, while if it is considerable, there is a continuation
of the shock and the patient goes into collapse. With this, there is an
increase of the pulse frequency, a drop in the blood pressure and a
leucocytosis.

Rupture or abortion usually means death of the ovum, consequently
there is no further use for the decidua which has been prepared inside
of the uterus; and this is expelled piecemeal or in decidual mass as a
cast, accompanied by uterine hemorrhage.

Primary rupture or abortion generally occurs before the eighth week

of pregnancy and is seldom attended with tragic symptoms. There is usually an intervening period of several days, sometimes a week or more before the rupture takes place. This was found in over 80 per cent of tubal pregnancies making up this series; so there is little excuse for not heeding the danger signs and waiting for the tragic stage with the signs of severe internal hemorrhage. Any one, even of mediocre intelligence, can diagnosticate intraperitoneal rupture with its abdominal pain, collapse, pallor, and signs of internal hemorrhage.

TREATMENT

Among gynecologists, there is no diversity of opinion regarding the method of treatment of unruptured ectopic pregnancy. We operate by the abdominal route, remove the tube, or empty the tube of its contents, and so terminate the pregnancy. In the tragic stage, after rupture has taken place, however, we are dealing with a different proposition. The patient is in shock from an intraabdominal calamity and has lost blood in varying quantity, so that we are really dealing with the dual condition of shock and intraabdominal hemorrhage. Here again there is no question that for the continuance of life, the hemorrhage must be checked. Some general surgeons who do gynecology on the assumption that all surgery is within the domain of the general surgeon, persist in operating immediately on all cases of ruptured ectopic. When is immediately? Do they mean as soon as they see the patient and get her transferred to a hospital in their care? If they do, they don't do an immediate operation. The tube has ruptured hours before the consultant surgeon sees her. If she is going to bleed to death, she will have done so before his arrival, but she hasn't. The blood has clotted, the hemorrhage has stopped, and she will react. But the surgeon rushes in, trundles her into an ambulance, chills her in transit, infuses her with saline, increases her blood pressure, and blows the clot off the vessel, counteracting all that Nature has attempted by lowering the pressure, and then rushes in and does incomplete mutilative surgery. They justify this routine by the statement "we must tie the bleeding vessel irrespective of the cost," increased shock, mutilation, even death. This is not true, for primary rupture is not usually serious or fatal. Less than one per cent bleed to death, 3 out of 307 cases in this series from the primary rupture, as the usual erosion goes through an arterial twig, not the main vessel.

Bleeding continues until the blood pressure falls; a clot forms and the bleeding ceases. The patient reacts, feels well for a day or two, and then a secondary rupture occurs and the doctor who has treated her for indigestion has missed the psychological moment to do the operation in the nontragic stage.

Our experience, and it has not been inconsiderable. teaches us that the best time to operate is after reaction. This is shown by the slower pulse and gradual increase of blood pressure.

Almost all of these patients will come back with rest and morphia. We give them an initial dose of one-half grain, and one-quarter of a grain every three hours, reducing the respiration to eight or twelve. We have yet to see a case which has not reacted and become a safe operable risk under this treatment. No saline is used until after the operation, then never by infusion.

Blood transfusion is preferable when the vessel has been tied, never before; but it is indicated during the procedure in severe cases. The operation consists in properly removing the tube without interfering with the collateral circulation of the ovary. This can only be done by individual ligation of the vessels in the mesosalpinx, not by mass ligature.

After the tube is removed. the ovary is suspended by suture of the infundibular pelvic ligament to the round ligament and the raw surface at the top of the broad ligament peritonealized by whipping the meso-salpinx and round ligament together.

It is only possible by waiting for reaction from shock to select the time for operation; then we can give the woman her best chance both as to mortality and morbidity.

287 CLINTON AVENUE.

THE INCIDENCE OF PULMONARY EMBOLISM AND THROMBOSIS FOLLOWING HYSTERECTOMY FOR MYOMA UTERI*

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From the Clinic of the Woman's Hospital.

INTRODUCTION

AS HARVEY was the discoverer of the circulation of the blood, so Virchow is the discoverer of certain pathologic conditions of the blood producing thrombosis and embolism. During the years 1846 to 1856 Virchow gave to the world his doctrine of embolism based upon anatomical, experimental and clinical investigations which for com-pleteness, accuracy, and just discernment of the truth, must always remain a model of scientific research in medicine. I shall quote both Virchow and Welch freely in all that pertains in this paper to the pathology of these conditions.

PATHOLOGY

We may define an embolism, according to Welch, as an impaction in some part of the vascular system of any undissolved material brought there by the blood current. It may be solid, liquid, or gaseous, infective or noninfective. An embolism is generally understood to be a part or the whole of a detached thrombus which, in turn, may be defined as a solid mass or plug formed during life in the blood vessels or heart, from the constituents of the blood. An embolus may also be made up of bits of tissue, or fat cells, or parenchymatous cells, fragments of diseased heart valves, or foreign bodies transported through the arterial system and sometimes by the lymphatic system. The size and shape of the embolus and the direction and volume of the blood stream determine the route, the size and angle of the branches of the blood vessels determine the stopping point of the plug. Retrograde or paradoxical embolism occurs when an embolus is transported in the veins in a direction opposite to that of the blood stream and is caused by a back current produced by pressure on the vein when there is some obstruction to the flow, as a tumor or in severe coughing, especially if the valves in the veins are defective.

The consequences of an embolus depend upon its size and septic character. If the plug is large enough to completely obstruct a main branch of the pulmonary artery or one of the coronary arteries of the heart, or the bulbar vessels, death is immediate. If obstruction is not complete, the embolus in its turn becomes then the starting point of a secondary thrombosis and may completely block the vessel, or if it has lodged at the bifurcation of a vessel, a "riding embolus," it may in time block both branches. If the emboli are so small that only arterioles or capillaries are plugged, or if anastomoses are abundant, no circulatory disturbance of any consequence results; but if no adequate collateral circulation be established, the result to that part supplied by the plugged end is degeneration or death. An infarct is then an area of dead tissue perhaps best described by Cohnheim as a "coagulative necrosis." It is usually cone or triangular shape with the base toward the periphery of the organ, and is sharply circumscribed and hard in consistency, white, yellowish white or red in color if hemorrhage has occurred. If the venous pressure is high and the resistance in the tissues low, as in the spongy tissue of the lungs or in the intestines, the infarct is hemorrhagic but the process of coagulation necrosis is the same whether the infarct is red or white. If the embolus be septic, this coagulation necrosis furnishes a favorable nidus for local or pyemic infection.

The most constant symptom of embolism is pain which has been attributed to various causes but the most probable seems to be the local irritation produced by the sudden distention caused by the

plugging of the vessel and the irritation to nerve endings in the vascular wall. The pain is sudden in occurrence, sharp in character, and may be accompanied by chills or chilly sensation; more especially is this so if the embolus be septic. Other symptoms depend upon the artery obstructed, together with the degree of local anemia and infection produced.

It is not the purpose of this paper to deal with the terminal result of embolism. The sudden onset of a pulmonary embolus after the apparently complete recovery from an operation with the blocking of the trunk of one or both main branches of the pulmonary artery accompanied by sudden intense dyspnea, cyanosis, exophthalmos, syncope and death, does not demand differential diagnosis. The condition could not be mistaken, or the picture, once seen, forgotten. But, while statistics are very definite as to the occurrence of embolism with fatal results, they are not at all clear as to the occurrence of postoperative pulmonary conditions which may possibly owe their origin to small emboli in the lungs. The presence of an embolus is known only by the disturbance it causes, and, based upon this, the order of frequency is the pulmonary, renal, splenic, and cerebral vessels, less frequently the iliac, lower extremities, hepatic, and gastric arteries, the mesenteric and coronary arteries of the heart. An infarct in the liver, spleen or kidney may not give physical signs sufficiently definite to warrant the diagnosis because of the free anastomoses in these organs unless an embolism in some other part of the body arouses the suspicion, but a perisplenic friction rub or sudden appearance of blood and pus in the urine may help to establish the diagnosis of embolism especially if disease of the left heart exists. The frequency of pyelitis following operation may perhaps be due to infected emboli, for Welch has shown the kidney to be the most frequent seat of abscesses following intravascular injection of pyogenic staphylococci in rabbits. While embolism and thrombosis of the mesenteric arteries are not common, their occurrence might perhaps be more often found if sought for, as Watson collected eight cases which occurred in a single year in Boston. The collateral circulation is greater in that portion of the intestine supplied by the inferior mesenteric artery and consequently the disturbance less. The complete closure of the superior mesenteric artery, however, produces grave intestinal symptoms usually diagnosed as due to peritonitis. The abrupt onset, violent intestinal peristalsis with vomiting of blood, and the tarry stools followed by paralysis of the intestine should at least arouse the thought of a hemorrhagic infarct.

POSTOPERATIVE PULMONARY COMPLICATIONS

The incidence of pulmonary embolism varies with the character of the operation and the operators. In a series of 5710 operations done

by 10 different operators, pulmonary embolism occurred from nineteen hundredths of one per cent to five and three-tenths per cent, as shown in the following table:

Deaver in	750 cases	1.73%
Frank	400 "	1.75%
Spencer Wells	137 "	3.00%
Schauta	131 "	5.3 %
Chevreux	820 collected cases	2.7 %
Martin	97 "	1.2 %
Küstner	100 "	3.0 %
Clark & Norris	213 "	0.4 %
Broun	1500 collected cases Woman's Hospital	0.4 %
Peter Bent Brigham Hospital	1562 cases	0.19%
Total	5710 "	0.19-5.3 %

Cutler and Hunt in a recent study of postoperative lung complications give a summary of 18,000 laparotomies from eleven different hospitals with the incidence of pneumonia alone of 4.48 per cent. A total incidence of pulmonary emboli or postoperative pneumonia in 23,700 operations, of 9.51 per cent. Whipple (1915) in his study of postoperative pneumonia only in the Presbyterian Hospital reported 97 cases in 3,719 anesthesias, or 2.6 per cent, while Burnham in 1914 reported from the same hospital 59 cases of pleurisy (0.45 per cent) and 6 cases of empyemia following 13,000 operations (0.4 per cent) or nearly one-half of one per cent (0.49 per cent), approximately 3 per cent for the combined figures. Cutler and Hunt reported that at the Peter Bent Brigham Hospital of 1562 patients operated upon, 55, or 3½ per cent (3.52 per cent), developed a definite postoperative pulmonary complication.

When one considers that at both these hospitals the operations are done by skilled operators, the anesthesia is administered by trained anesthetists and every pre- and postoperative care is given to minimize the risks incident to the surgical procedure that can be thought of in a hospital with the highest standards, one cannot fail to be impressed with the frequency of lung complications following operations and ask the cause.

If one believes, as do Cutler and Hunt, that the origin is to be found in pulmonary emboli, which is a conclusion that has been arrived at also in a recent review by Hampton and Wharton of postoperative lung conditions in Johns Hopkins Hospital, one has abundant proof for this conclusion in a study of the pathologic lesions of the lungs. For it is in the lungs that one would expect to find most frequently thrombi or emboli. Welch says that primary thrombus of the pulmonary arteries particularly of the medium-sized and smaller branches is more

frequent than is represented in textbooks, and Pitt states that thrombi are more frequent in the pulmonary arteries than in any other vein or artery in the body. Clinically a thrombosis of the pulmonary artery produces symptoms similar to a pulmonary embolus. The origin of the large emboli is in a peripheral venous thrombosis or diseased right heart, but pulmonary hemorrhagic infarcts are usually multiple and found in the lower lobe more commonly on the right side and come from a diseased right heart more frequently than from a peripheral thrombus.

TIME OF OCCURRENCE

The time of the occurrence of fatal pulmonary embolism we know to be frequently soon after operation. Hampton and Wharton reported that half of their cases of embolism developed within the first six days, one at the end of 24 hours and one fatal attack occurred three hours after operation. Gibson says 60 per cent of the cases of embolism occur in the first week after operation and more deaths in the first and second twenty-four hours. Of three cases of fatal embolism at the Woman's Hospital following 617 hysterectomies for myomata uteri three occurred in 48 hours, 6 days and 8 days, respectively, after the operation. Küstner reports two cases two and three hours each after operation.

PHYSICAL SIGNS AND DIFFERENTIAL DIAGNOSIS

The autopsy picture of the lungs following acute embolism is that of edema and congestion. If minute emboli were showered into the lungs from the operative field during anesthesia, the congestion produced would give the physical signs we often attribute to the anesthetic and designate bronchitis, pleurisy or ether pneumonia. The clinical course, however, differs from that of inflammatory conditions of the lungs. The initial symptom is usually localized pain, accompanied by dyspnea and possibly a chill soon followed by bloody expectoration which, in the absence of tuberculosis, is almost pathognomonic. Associated with the sputum is evidence of circumscribed consolidation and subcrepitant râles with moderate elevation of temperature and moderate leucocytosis. If the process is not an infective one, the conditions improve in three or four days to be followed in a few days' time, perhaps, by the appearance of a thrombus in the lower extremities. If the process is infective an inflammatory condition results which may be recovered from or may terminate in gangrene of the lung or empyema. The differential diagnosis from pneumonia when the emboli are bland is based upon the short duration of physical signs in the chest, the character of the sputum, which is never tenacious and rusty, but copious, watery and contains flecks or streaks of blood. The

absence of evidence of consolidation, cyanosis, high sustained temperature, leucocytosis and general appearance of severe illness differentiate the condition from pneumonia. It is of considerable interest that these pulmonary symptoms have been described by Dr. Lewis A. Conner of the New York Hospital as the "Premonitory Signs of Venous Thrombosis" in a series of studies on typhoid fever. Dr. Connor believes that there are three well-marked groups, viz.: "Group 1. Those in which friction rub or crepitant râles over a small area were the only signs. These signs often lasted only two or three days. Group 2. Cases in which the signs were those of a small circumscribed pneumonia. The area of consolidation did not extend and in each instance the signs of consolidation disappeared within three or four days. These signs were almost always in the lower lobes. Group 3. Cases with signs of extensive plastic pleurisy or of plural effusion." As the premonitory signs and clinical course are very similar to those seen in three cases which occurred almost simultaneously on the division of Dr. George Gray Ward in the Woman's Hospital in connection with the x-ray pictures of the cases, it may be of interest to give the histories somewhat in detail.

CASE 1.—Mrs. J., No. 27627. Age thirty-four. Colored. Heart and lungs normal. Red cells 4,500,000, Hemoglobin 95 per cent, white cells 8,000, 60 per cent polymorphonuclears. Operation by Dr. Ward March 22nd, 1921. Supravaginal hysterectomy, double salpingo-oophorectomy and prophylactic appendectomy. Duration of the operation 1 hour 5 minutes. Pathological Report.—Large fibromyomata uteri, chronic salpingitis and perisalpingitis, perioophoritis. Appendix normal. First day after operation temperature 102°, pulse 120, respiration 28. That night the patient complained of severe pain in the chest. Second day after operation temperature 101.8°, pulse 120, respiration 44. Pain in the chest had increased and there was cough and bloody expectoration, dullness at base of the right lung posteriorly and fine râles but no increase in respiratory sounds. Third day after operation temperature 101°, pulse 112, respiration 40. The patient was seen in consultation by an internist, and as there was now slight dullness, increase in voice and fine râles in an area at the lowest portion of both lungs and friction râles at the right base anteriorly, the case was diagnosed as bronchopneumonia associated with pleurisy.

On the fourth day after operation, temperature was 100.6°, pulse 100, respiration 38. Patient feeling much better. Fifth day after operation temperature 100.4°, pulse 100, respiration 36. The patient was still coughing, had copious watery blood-tinged sputum, but the lungs were almost clear. The laboratory examination showed pneumococci in the sputum, epithelial cells numerous, but practically no leucocytes. The patient was now complaining of pain in the lower left quadrant, of the abdomen and as the thought of thrombosis was now in mind she was sent at once for an x-ray of the chest, which was negative for lobar pneumonia. Seventh day after operation and fifth day after the onset of lung symptoms the patient complained of chilly feeling and pain in the left leg which was found to be swollen from a thrombosis in the left femoral vein.

The rest of the convalescence was normal. There was primary union of the abdominal wall. The cough and bloody sputum ceased by the ninth day but the temperature, pulse and respiration were not normal until the twenty-second day.

CASE 2.—Mrs. H., No. 27639. Age 26. Colored. Heart and lungs normal. Red cells 4,350,000, hemoglobin 98 per cent, white cells 6,000, polymorph. 64 per cent.

Operation by Dr. Farrar, March, 22, 1921. Resection of right fallopian tube for an unruptured tubal pregnancy. Duration of the operation 20 minutes. During the operation the pulse was reported by the anesthetist to have suddenly become very rapid and poor in quality and respiration shallow and the operation was hastened. First day after operation temperature 99.8°, pulse 112, respirations 24. The convalescence was negative until the seventh day after operation when the patient complained of nausea and vomited blood-tinged fluid. The vomiting continued until the next day when the patient began to cough and expectorated bloody fluid which was negative for tubercle bacilli but contained pneumococci Type IV. Temperature 98.4°, pulse 126, respiration 28. The physical signs were friction rub and subcrepitant râles. The x-ray plates were negative for tuberculosis or pneumonia. Twenty-seven days after operation the patient complained of pain in the lower right pelvis. Thirty-four days after operation there was extreme tenderness over the right femoral vein and swelling of the right leg. As the patient is still convalescing it is impossible to tell the outcome. There was primary union of the abdominal wound.

CASE 3.—Mrs. C., No. 27365. Age twenty-seven. White. Heart and lungs negative. Red cells 4,800,000, hemoglobin 100 per cent, white cells 13,200, polymorphs., 79 per cent.

Operation by Dr. Ward, salpingectomy, right. Appendectomy. Simpson operation for retroversion. Duration of the operation 1 hour 4 mins. Pathological report: Adenomyoma of the tube. Acute appendicitis.

It was noted on arrival of the patient in the Recovery Room that the condition was good but color poor, pulse 120, respiration 22. Rattling of mucus in the throat. One hour later the pulse was 160, repiration 38 and difficulty in breathing. Skin blue. Four hours later the patient was coughing and expectorating mucus and complaining of pain in the chest.

First day after operation temp. 104° (rectal), pulse 140, respiration 50. The cough and bloody sputum were now increased in severity and amount. Second and third day after operation, temp. 102.8° (rectal), pulse 130, respiration 38. Until seventh day after operation, temp. 102, pulse 102-130, respiration 36.

After the seventh day, temperature and pulse remained below 100, while respiration continued between 30 and 24 until the sixteenth day. There was primary union of the abdominal wound. The physical findings: 24 hours after the operation there was moderate dullness over the whole of the right lower lobe. Fine râles and friction rub. Diagnosis pneumonia and pleurisy. The leucocyte count was below 16,000, the polymorphonuclears 78 per cent. The sputum was clear with flecks of blood and moderate in amount. The x-ray picture 14 days after operation showed plural thickening, unresolved pneumonia and infiltration in the hilum.

In the first two cases we have much the same clinical course and physical findings. Both were clean cases, both had presumably large pelvic veins, due in one case to a very large myomatous uterus and in the other to a tubal pregnancy. In the first case the lung symptoms began about thirty-two hours after the operation, and in the second case a week after unless we may consider that disturbance of pulse and respiration during operation was caused by an embolus. In both cases the emboli were evidently bland as no inflammatory process resulted in the lung and each case showed later the presence of a thrombus in a femoral vein. The third case was one of acute appendicitis with pus

in the lumen of the appendix. There was no spilling of pus during the
appendectomy, no symptoms later referable to the abdomen and there
was primary union of the wound but the embolus was evidently in-
fective as an inflammatory process followed immediately. This case
did not show a thrombus of the veins of the lower extremity as did the
other two, but is classed as an embolus case for the following reasons:
(1) The onset of symptoms immediately following the operation. (2)
The mild course of the lung symptoms. (3) Bloody sputum. (4) X-ray
picture of the lung.

<div align="center">ETIOLOGY</div>

In seeking the etiology of surgical embolism and thrombosis we
must look to an alteration in the circulation. More deaths, Gibson says,
occur from embolism in the first and second twenty-four hours—too
rapid for any but an overwhelming infection which is not borne out
by autopsy findings. The postoperative lung complications Cutler and
Hunt showed were manifest in three-fourths of the cases (76.4 per
cent) within forty-eight hours after the operations, again too soon
for the incubation period of infection. Virchow believed the cause
of thrombosis and embolism lay in an enfeebled circulation and that
inflammation of the wall if present was merely a secondary effect. The
greatest frequency of embolism and thrombosis is after operations in
the lower abdomen. It is after hysterectomy with large fibroids or
after pregnancy where continued pressure on the veins of the lower
extremities has kept these veins overdistended that thrombosis and
embolism most frequently occur and less frequently after pelvic opera-
tions on pus tubes or ovarian abscesses where bacteria would furnish
abundant cause if it were the chief etiological factor in embolism.
The femoral veins are attached to bone and fascia just above the valves
near Poupart's ligament, which prevent the veins readily adjusting
themselves to a diminished blood volume. Counter currents or an
eddying motion of the blood attributed by von Recklinghausen to
thrombosis formation may result, aided in the left femoral vein by the
greater difficulty in the return flow due to the increased length and
obliquity of the left common iliac vein and its passage under the left
common iliac artery. A distended sigmoid or rectum favors stasis in
the blood stream. The fall in blood pressure which is the usual re-
sult in a hysterectomy operation, due to loss of blood and injury to
ganglia cells, causes a sudden diminution in the blood volume of the
femoral vein while its fixed attachment prevents it from quickly ad-
justing itself to the smaller blood stream. Thrombi are both red and
white. The red thrombi are formed from stagnating blood and resem-
ble a clot in shed blood. The white thrombi are formed from circulat-
ing blood and consist chiefly of altered blood platelets, polynuclear leu-

cocytes, fibrillated fibrin in large amounts with a varying number of red corpuscles. It is believed that impairment to the nutrition cells of the vascular wall is necessary for the formation of white thrombi, and that this occurs very quickly when there is a diminution in the volume of the blood stream. The large veins of the pelvis, the slowing down of the blood stream, the diminished volume with consequent loss of nutrition to the vessel walls, combined with the character of an operation whose severity is often lost sight of in the usual smooth convalescence but which from the injury to ganglia cells produces the condition we term shock which favors thrombosis formation.

While sepsis may be the source of emboli, it does not appear to play as great a rôle as circulatory disturbances in pulmonary thrombosis and embolism, for the temperature is usually only moderately elevated, the leucocytosis not marked, and the condition usually soon recovered from.

A thrombus has been likened to a serpent in appearance. Its head is the white thrombus, its neck gray and the tail, which is formed last, is red. But, unlike in the serpent, it is the tail which carries the venom, for when the tail is sufficiently long to reach the middle of the blood stream its head is still held fast to the wall of the vessel, but the soft red clot at the tip of the tail moving with the current is easily broken off and swept away by any sudden increase in the rate of flow or by pressure on the vessel wall, either of which may occur on the first sitting up or getting out of bed, etc.

Hampton and Wharton report that in their autopsy records 85 per cent of the fatal pulmonary embolism cases had their origin in an embolus from the pelvic veins and that it seems probable that traumatic and mechanical factors play a larger part in the formation of pelvic thrombosis than infection.

The anemia which is often present, due to menorrhagia or metrorrhagia, may contribute to a lowered resistance and also to the "myoma heart" which in itself may be a cause of venous thrombosis as almost any heart lesion producing myocardial insufficiency may be the cause of a thrombosis.

REVIEW OF OPERATIONS IN THE WOMAN'S HOSPITAL

In accordance with this theory it has been of interest to review 130 cases operated upon for myoma uteri by Dr. Ward and myself in the Woman's Hospital from March 1, 1918, to March 1, 1920.

In these two years all ward patients having large fibroids necessitating removal were kept in bed from five to seven days previous to operation and no embolism or thrombosis occurred in any case. In the private patients who were not kept in bed previous to the operation but usually operated upon the day after entrance to the hospital, a

fatal embolism occurred once and venous thrombosis six times with exactly the same technic employed for both class of cases except that the ward patients had been kept in bed previous to the operation.

In the past year blood pressure was maintained by glucose and gum acacia given intravenously throughout a series of approximately 250 operations. The series included hysterectomies for myomata uteri and in no case in the whole series did embolism or thrombosis occur, while in other cases done by the same two operators without maintaining blood pressure or preliminary rest in bed, embolism or thrombosis occurred four times.

While it is true the number is too small to draw positive conclusions from, it is believed that the tonic effect on the heart and blood vessels obtained by relieving the pressure from large tumors in the pelvis has been a factor in the prevention of embolism and the maintenance of blood pressure during operation has materially assisted this.

CONCLUSIONS

1. The most frequent cause of postoperative pulmonary complications following hysterectomy for myoma uteri, is pulmonary embolism or thrombosis.

2. The source of pulmonary embolism or thrombosis is a thrombosis of the pelvic veins or the veins of the lower extremities, or a thrombosis of the right heart.

3. Thrombosis of the pelvic veins occurs much more frequently than thrombosis of the lower extremities.

4. The development of a thrombosis or embolism may be during an operation or immediately following it. The most frequent time seems to be in the first forty-eight hours.

5. The symptoms in the order of their most frequent occurrence are pain, friction rub, cough, bloody sputum and râles, dullness and alteration of breath sounds.

6. These signs are premonitory of a thrombosis but the evidences of thrombosis in the veins of the lower extremities or pelvic veins do not appear until later.

7. The physical findings at the onset are similar to lobar pneumonia or pleurisy, but the clinical picture soon separates the cases. In differential diagnosis the x-ray may be of value.

8. Thrombosis and embolism occur more frequently after hysterectomy for large myomata and less frequently after operation on pus tubes and ovarian abscesses.

9. The causes are (A) an enfeebled circulation due to (a) dilated venous trunks, especially of the pelvis and lower extremities, (b) venous stasis, (c) lowered blood volume due to hemorrhage or shock, (d) myocardial insufficiency, (B) infection.

10. The treatment should be prophylactic and directed to improving the circulation of the blood by strengthening the heart muscle and walls of the blood vessels and increasing the hemoglobin of the blood. The importance of rest in bed as a preliminary to operation to relieve the pressure of large myomata on the veins of the pelvis and lower extremities, the use of blood transfusion *before* operation in cases of marked anemia and the maintenance of the blood volume during operation by gum glucose given intravenously, should be emphasized.

611 WEST 110TH STREET.

Society Transactions

**Symposium: To What Extent Should Delivery be Hastened or
Assisted by Operative Interference**

DR. RUDOLPH W. HOLMES, of Chicago, read a paper entitled **Fads and
Fancies. A Comment on the Pseudo-Scientific Trend of Modern
Obstetrics.** (For original article see page 225.)

DR. JOHN OSBORN POLAK, of Brooklyn, read a paper entitled **Forced
Labor,—Its Status.** (For original article see page 237.)

DR. BROOKE M. ANSPACH, of Philadelphia, read a paper entitled **The
Drudgery of Obstetrics, with Some Suggestions for Relief.** (For
original article see page 245.)

DISCUSSION OF SYMPOSIUM

DR. IRVING W. POTTER, BUFFALO, NEW YORK (by invitation).—I appreciate
your invitation to open this discussion. I have been very much gratified at the
papers and very much entertained by the statistics. I am not sorry that I read my
first, second and third papers on version, for I can see a considerable change in the
expressions of opinion from observers in different sections of the country, and I
am going to continue to read papers on version and to do the operation. I am
striving all the time to reduce my fetal mortality since the presentation of my
first paper. I have had better results since. I am sure that I will get still better
results and so will every one who does intelligent elective version.

Our conditions at home are somewhat different from those that most of you
have. We have no large hospital where we can take all of our cases. There
is not a hospital in Buffalo that will give me the number of beds I want, con-
sequently I am working in five or six different institutions. That in itself will
raise the fetal mortality, will raise morbidity, but things are gradually getting bet-
ter, and it is gratifying to me to find that men from different parts of the country,
after they come to Buffalo and see me at work, have changed their views in reference
to my work from those they held five years ago.

It seems to me, that the discussion of these papers must be largely upon the
following questions, first, whether or not we have any right to interfere in the
progress of a case of labor, whereby we may in any way shorten the duration
of that labor in the interests of the mother, to relieve her of her suffering and
pain as well as the damage to her soft parts from prolonged pressure, and secondly,
in the interests of the child, in relieving pressure both cranial and body. Have

we any right to relieve pain? It seems to me that we have. Have we any right to shorten labor provided no damage is done to mother or child? I think we have.

Granting that we have such right, how shall we use it? Personally, I am opposed to the induction of labor and the use of bags. Bags do not give the obliteration of the cervix desired nor the degree of dilatation of the os that is required. Such obliteration and dilatation must occur from the rearrangement of muscle fibers beginning at the fundus and not from the cervix. Bags also have a tendency to displace the presenting part and allow prolapse of the cord or one or more extremities. My preference in the management of these cases is to do an elective version. By that term I mean to perform podalic version at a certain time during the progress of the labor and that time is at the end of the first stage or early in the second stage, thereby endeavoring to eliminate the second stage entirely or at least the greater part of it. In view of the fact that so many complications arise, is not this method of early version justifiable?

My claims for such a procedure are that patients suffer less pain, are less liable to infection because of the lessened mutilation of the soft parts, have a better involution of the uterus, and a better sense of well-being at the end of the lying-in period. No cystoceles or rectoceles are seen following this procedure when properly performed, and extensive lacerations are unheard of. Neither need one fear hemorrhage.

As to the child, we have frequently observed that it was easier to deliver a larger child by version, than it was by an oncoming head; that the damage to the child was far less apparently, than in prolonged forceps operations; that the children are in as good, if not better conditions at the end of 10 days as to gain in weight and general appearance, than in cases where a prolonged second stage was allowed. Our maternal morbidity is less than formerly and the maternal mortality should be *nil*. The fetal mortality we claim is lowered. Our latest statistics covering our last 1000 cases show a $4\frac{1}{2}$ per cent fetal mortality.

Mr. President and Gentlemen, this is not a fad or a fancy, but a procedure that is allowable in the hands of a properly trained man. These statements are facts and can be substantiated by hospital records.

Surely, with our present knowledge of asepsis, if we cannot invade the uterine cavity with safety in the interests of the suffering woman, then I must agree with Dr. Holmes that obstetrics is a lost art.

DR. JOSEPH B. DE LEE, Chicago.—In the first place, I desire to dispose of some of the arguments which my colleague (Dr. Holmes) from Chicago has advanced.

The statistics which he has adduced are some old, some new, mostly bad and useless. Statistics in general are very insecure building stones on which to base judgment. The statistics of Newark should not be applied, even if they are true, to the general practitioner neither should they be applied to this Society. Dr. Holmes is charging windmills in a great many of his remarks.

Let us eliminate from the discussion cesarean section for placenta previa. Let us also eliminate the treatment of eclampsia by active measures. Let us limit it to the five points which Dr. Polak has brought out, and which really are the subjects for discussion.

With one sentence I will dispose of pituitrin. Pituitrin in my opinion is an almost criminal agent if used before the delivery of the child.

Regarding the early expression of the placenta, Dr. Polak is right. The placenta should not be expelled before it is completely separated. If the placenta is in the vagina, usually visible without pressure, but if not visible without pressure, visible by separating the labia, there is no reason why it should not be expelled, and its expulsion by pressure on the fundus will not increase the hemorrhage.

Regarding the so-called prophylactic forceps, a name which I have the honor and

perhaps disgrace to have introduced, there are present before me a certain number (how many I cannot tell) who are doing prophylactic forceps right along. Some of them have acknowledged it to me. That is not to their discredit; I consider it to their credit. We must, as Dr. Polak points out, prove that this interference in labor brings good results, and that in course of time we will probably be able to do.

The time has come, and for some of us has long passed, for a division in the methods of treatment of natural delivery into that by the specialist and that by the general practitioner. The women are beginning to realize that they need not suffer the damage of labor, the permanent invalidism and death that their mothers suffered. They have learned to seek expert skill and they are willing to pay for it. Further, they are not willing to suffer the pain of labor, and demand its relief.

Many women are ready to undergo the slightly increased risk of cesarean section in order to avoid the perils and pain of even ordinary labor. I am confident that if the women were given only a little encouragement in this direction, the demand for cesarean section would be overwhelming.

A careful study of one's own cases will show that even natural labor can cause much damage. The damage is mainly in the cervix, the pericervical tissues, the pelvic fascia and the pelvic floor. It is unnecessary to enumerate the many sequelae of these injuries. We cannot deny their frequency and their rôle in the causation of permanent invalidism. In the last two years I have paid particular attention to these damages. One in five mothers has good closure; four have tears or relaxation, though there need not be bad symptoms at present. These come later. With few exceptions, all women show evidence of anatomic damage.

We know that too many babies die in labor, even in natural deliveries, yet when last year I presented a simple and harmless method for saving a percentage of these babies, several of our members criticized the method unfavorably.

Last year I read a paper called "Prophylactic Forceps." In the discussion, our guest, Dr. Eden, of London, condemned the operation. On the same day Dr. Eden complained bitterly of the high mortality of the neonati of his clinic and the large number of stillbirths. Fifty healthy babies, he said, had died in spontaneous normal labor in the hands of his own expert assistants, and he thought something ought to be done about it. I, too, think something ought to have been done about it, and I wonder how many of these full term, healthy babies might have been saved by the prophylactic forceps operation. If I may be permitted to hazard a guess, I would say perhaps 40 of them. However, it was a great concession by Dr. Eden, to admit that normal labor could kill babies, and I am also wondering how he can escape the conviction that natural labor is pathogenic.

I claim that the powers of natural labor are dangerous and destructive in many instances to both mother and child, and that interference by a skilled accoucheur at the proper time can prevent a goodly portion of this danger and much of this destruction.

It will need a high degree of obstetric skill to determine when interference is less dangerous than Nature's own methods, and to render the interference less dangerous, but the first is what we specialists are for, and the second, is what we are being paid to do. There is no question that in unskilled hands, many things that we can do with safety, will prove dangerous and fatal, but this is no reason why we should not do them.

We must not pull obstetrics down to the level of the practice of the general practitioner. We must pull the latter up to our level.

As to one method of interference in natural labor, I can refer to my paper of last year, the prophylactic forceps operation. The objects of this procedure are: 1. To save the pelvic floor and fascia from destruction. 2. To save the woman from exhaustion and hemorrhage, even moderate bleeding. 3. To save the child from

injurious pressure or death. The essentials of the method are: 1. Procure complete spontaneous dilatation of the cervix. 2. Use morphine and scopolamine or other narcotics freely in the first stage. 3. When the head has come down on to the pelvic floor, and before the fasciæ have been destroyed and the levator ani pillars parted, incision and forceps delivery. 4. Pituitrin and ergot to save blood. 5. Early removal of the placenta from the vagina. 6. Anatomical repair. 7. Morphine and scopolamine to save ether and produce amnesia of the labor.

I had the opportunity to demonstrate this operation to Dr. E. C. Dudley, Dr. Austin Flint and Dr. Brooke M. Anspach. The two first named were enthusiastic and readily admitted that both mother and child had suffered less damage than in a normal labor. Dr. Anspach may express himself here. I believe many of those present frequently deliver women early in the second stage, but do not publish it.

For Dr. Potter's method of delivery I have no sympathy. His own declared results condemn it. He had 10 fetal deaths from hemophilia, 14 deaths from convulsions, 5 unexplained deaths, in addition to 41 deaths during delivery itself, in 1100 cases. His own published mortality of 1123 cases, including 80 cesarean sections, is about 7.5 per cent of the babies. This is much too great, and these women are paying too high a price for their relief from pain in the second stage. At the Chicago Lying-in Hospital under conservative management in the last 9258 cases we have had a gross mortality of 336, or 3.6 per cent. This includes all premature children after the seventh month, weighing 1000 grams or over; it includes all macerated fetuses (86), monstrosities, and also those children born alive and dying before the mothers left the hospital. There were 228 stillbirths and 109 dying after birth. Only one child died from hemorrhage; 1 in 9258. Dr. Potter had 10 deaths from hemorrhage in 1123. It is well known that injury predisposes to bleeding in neonati. One of Dr. Potter's disciples published fetal mortalities ranging from 8 to 17 per cent. Dr. Potter claims that he has no more or greater lacerations with his version than the ordinary practitioner. This argument has weight against his method of delivery. We must learn how to reduce, we cannot eliminate, the damage of labor.

DR. RALPH POMEROY, Brooklyn, New York.—I personally have no definite opinion about this matter. I am trying to learn something at this time, and I have been through certain stages of development that almost call for presentation, because I find myself very curiously in a position among the profession of being a radical among many followers of extreme conservatism, and I do not know exactly how to account for it.

In the first place, some 15 years ago I presented for the first time a dilating bag that created a good deal of commotion. Everybody who understood mechanics thought it would do the thing I supposed it would do very nicely, and that is, expand the cervix, but soon after I had published the matter it was taken up as a method of inducing labor. I was never willing to induce labor with anything except by the usual means, consequently I have had the reputation of inducing labor with an apparatus with which I never intended to induce labor.

In the next place, I advocated one principal kind of incision of the perineum as a prophylactic measure, and I have been accused of cutting everything. My own immediate assistants know that is not true, and that the cases are selected.

With regard to the work of Dr. Potter, I sent my own assistant to see him work, and I repudiate any possibility that I am likely to imitate Dr. Potter. I have a most emphatic and wholesale admiration for the development that Dr. Potter has made in the mechanics and surgical process of podalic version plus extraction, but to revert to the general proposition, the principal point I wish to make is that our units of conservation in labor and pregnancy are not the first born but the family, and I refuse to follow Dr. Potter to his logical conclusion that every large child

must be taken out by a cesarean section, because it will not be easy or safe to take it in any other way.

With reference to delivery by cesarean section, Dr. Potter has done it on one of every 13 cases. In other words, there are 18 deliveries by cesarean section in his report of 1000 cases. It is a perfectly logical thing to do if we think of obstetrics in the extreme cases as well as in the moderate and in the minor. Does this assembly accept the proposition for one minute that safe obstetrics is midwifery obstetrics? Of course, it does not. The trouble with obstetrics is that we know a whole lot about it and are just as much entitled to have progressive radicals in trying to see what can be done with serious problems as the surgeons have, because this is a major subject in surgery.

Dr. Potter should be honored, and Dr. De Lee should be honored, as well as others, who have published books on obstetric surgery, for their enterprise. But who practices our obstetrics? Midwives, trained and untrained, students trained and untrained, and interns, all amateurs, most certainly should receive training in this regard, and perhaps a few of us who practice obstetrics. There are not enough obstetricians to go around. The individual woman knows what she wants, and Dr. De Lee and Dr. Anspach have indicated that very clearly, but Dr. Anspach should remember one point, that he will never get any woman to be cared for at her invitation or agreement. She selects her obstetrician as she selects her bridesmaids. In other words, pregnancy and labor is a social event and not a physical event. The woman wants to get away with it with safety and comfort, and with no actual damage, and she hopes there is some one who can carry that out.

My experience is that the only way we will ever solve this problem in an institution of magnitude is by being residents in the institution, one relieving the other every twelve hours, and then we may slip up if we do not have a system by which every item of fact is exchanged in connection with the case when a new man comes on. In cases of prolonged labor it is much better to work in relays rather than adopt the mental attitude and mental picture of the surgeon who is trying to see a case through from one end to the other.

In connection with the statistics given by Dr. Polak and Dr. Holmes, the one thing to be brought out is that obstetrics is not practiced as it is known. In other words, the execution of our work is not up to the standard of our knowledge, and it is extremely difficult to make it so.

DR. PHILANDER A. HARRIS, PATERSON, NEW JERSEY.—I wish to speak from the standpoint of the psychology of Dr. Holmes' statistics as presented to us in his very elaborate tables and in his very extensive review of cases. He referred to Newark; I live near Newark. He spoke of better recoveries and a less mortality in the hands of midwives in Newark than among members of our profession. I think it would be a mistake to publish that statement in a report of our proceedings or in a medical journal and let it go broadcast, because this information would be placed in the hands of a lot of people who belong to the extremely radical elements of socialism.

We know that industrial health insurance has to be fought out in almost every state in the Union. The New Jersey Medical Society this winter spent a tremendous lot of time on this subject, and some of our best physicians went to Trenton for weeks to see the representatives of the legislature, and what for? To prevent having industrial health insurance put over in New Jersey. At the same time, they had two other duties to perform. They had to work to prevent osteopathic practitioners from getting a full board of examiners, so that they could follow their kind of practice in New Jersey.

I sincerely hope that when Dr. Holmes publishes his paper, he will keep in mind that the midwife, as I understand it, does not have any deaths. When her cases are

bad, they fall into the hands of others, who make out the death certificates, and Dr. Holmes should revise or rearrange that part of his statistics which will show this. It is of great importance that this be done now, because unless his statements are corrected or modified, they will be the first thing we will hear about in the legislature this winter.

DR. EDWARD P. DAVIS, PHILADELPHIA.—Spontaneous delivery is not without injury. Concerning the discussion this morning, it points very clearly to our condemnation of two things. First, pituitrin before the child is out of the uterus is dangerous. Second, I am glad to know we have learned that a dilating bag cannot dilate the uterus successfully because it does not favor retraction of the cervix uteri.

We must first consider the good of our patients, which should be the first aim, and then the good of our profession. Dr. Potter and Dr. De Lee illustrate what skilled specialists can do. Other men devoting the same time, with very similar lines of research and practice, will do as well. What is the profession to do? I would speak as a teacher who is accustomed to addressing men who are shortly to become practitioners. This is my expression to the senior class: I hope that few of them will undertake major obstetric operations; that such operations should be done by specialists only, and I do not believe in making serious obstetric procedures attractive or apparently easy for the graduating student. The graduate student should be taught carefully the signs of normal labor and its mechanism and the physiology of analgesia and anesthesia in normal labor; delivery of the patient by spontaneous parturition, the immediate closure of lacerations; the methods of asepsis and, when a normal labor is attended with difficulty, it is time for expert skill. The profession should stand firmly on that ground and the public should be educated to that point of view, and not until then will there be a substantial improvement in obstetrics. I deny absolutely that the best operators in this country are doing wrong in spreading the doctrine to apply skill, intelligence and judgment toward terminating the sufferings of mothers and saving infant life. I do not believe that for one moment. Great advances have been made in the treatment of toxemia and in obstetric surgery, but the latter must be done by obstetric surgeons, and I do not believe any recent graduate can so denominate himself justly and rightly.

Furthermore, we still lack in this trial two important portions of evidence. You have heard the claimants present certain statistics. The statistics of pediatricians and neurologists must also be brought forward, which will tell us how many infants have epilepsy or deficient mental development. Let them report these conditions, and let us know how many of these cases, where epileptic convulsions or deficient development followed, occurred after spontaneous parturition. In the second place, the statistics from the gynecological clinics should be presented, showing how many patients required a secondary operation for repair who were delivered by obstetric surgeons. Then we will be able to come nearer the truth.

DR. WILLIAM S. STONE, NEW YORK CITY.—I cannot refrain from expressing one thought in this discussion which I regard as a most important review of obstetric therapeutics; and I am particularly impressed with the expression which Dr. Polak used which, it seems to me, goes to the basis of the whole thing, that is, intelligent, aseptic expectancy. I regard that as the basis of teaching, and that upon that principle a man should be taught to carry out obstetrics, but who is going to do that? I am quite sure that the expectancy part makes it an impractical thing for any of the men assembled in this room, except the experts in obstetrics, to carry out, and Dr. Anspach suggested something in the way of a remedy.

I would like to call your attention to one thing as I have observed obstetrics develop in New York. We do not really have consulting obstetricians. Our obstetricians are professors of obstetrics, they take cases of obstetrics themselves, and

the result is that I do not believe that men who are so busy can carry out all the knowledge which we have of obstetrics. In other words, in medicine we have consulting medical men who do not take cases of pneumonia themselves or typhoid fever cases, but they come in as real consultants. It seems to me, there is a field to be developed here, and that for those of us who are skilled obstetricians to limit our work and to give the benefit of our experience in the way of consulting work, and then our teaching will be based upon the principle that Dr. Polak has suggested.

DR. GEORGE W. KOSMAK, New York City.—I am rather astonished at the character of the statistics brought forward by Dr. Holmes, and I think very likely I express the sentiment of wonder in the minds of a great many of us here at the advisability of bringing them forward in a discussion of this kind. These statistics on the various abnormalities of pregnancy and labor, which refer to observations made 50 or 100 years ago, I think are hardly a fair basis for comparison because at that time the standards were different. There were a great many conditions then accepted which we would not accept at the present day, such as puerperal fever. I think almost every pregnant woman, during the first fifty years of the last century who went into labor, expected to have puerperal fever, and for that matter they felt that labor would necessarily last a considerably longer time, especially in a first pregnancy. It is hardly fair to accept the statistics of the earlier writers in comparison with what has been accomplished during the past few decades.

I believe that Dr. Holmes is entirely too pessimistic as regards the obstetric situation, and that we are warranted by the accomplishments of the last few decades, in assuming a more optimistic attitude.

I desire to refer also to the remarks made by Dr. Harris which I had hoped he would develop somewhat further. Gentlemen, we are facing a rather serious proposition as obstetricians because our state of mind is going to be very much shocked within the next few years by the efforts at reform by lay persons, methods that will not be based on medical facts and on medical experience, but on sociological experiments. You will have brought before you at the executive meeting of this Society a report by the special committee appointed last year to consider this subject of maternal welfare in a broad general way in connection with other committees from other societies. I hope you will bear in mind the discussion today when you consider that report. Specifically, I desire to refer to legislation now pending in Washington in the shape of the Sheppard-Towner bill which on the face of it is one of the most radical steps to which we as medical men have been asked to subscribe. It will practically take out of the hands of the medical profession the care of pregnant women and children, and place their observation in the hands of lay persons, not to be solved as a medical but as a sociological problem.

DR. FRANKLIN S. NEWELL, Boston.—There seems to be one point that has not been brought out in the discussion so far. I will say my own personal bias is in favor of Dr. De Lee's prophylactic use of forceps, but when it comes to the question of how every woman should be taken care of, we must study the needs of the individual patient. In the first place, one woman can be delivered with little or no anesthesia in spontaneous labor without any ill effects, while the next woman must have labor shortened, or she will suffer mentally or physically as a result of it. Some women are better delivered by version. To adopt any standard routine and say that a woman must be delivered by a certain method is unintelligent obstetrics. In regard to analgesia I believe that nitrous oxide reenforced by morphine or scopolamine, if needed, is the most valuable method of making labor easier for a woman. In delivering my patients I have nitrous oxide started when the patient feels the need of relief. Patients do not want the anesthetic postponed until we are convinced that they must have relief.

One other point I wish to bring up is that I do not believe in the induction of labor except for cause. If a patient needs to have labor induced, that is a different matter, but to interfere with normal pregnancy for no cause seems to me meddlesome and pernicious. I feel very strongly that most postpartum hemorrhages are due to unwise interference in the third stage of labor, and the longer the placenta there is left *in situ*, i.e., until complete separation has taken place, the better the results for our patients.

DR. ROBERT L. DICKINSON, BROOKLYN, NEW YORK.—This discussion sharply differentiates between the expert with his hospital experience, such as Dr. Polak has demonstrated, and the general practitioner who must take care of the bulk of cases, and the midwife who must take care of the foreign population.

Medicine is proverbially myopic. We refuse to see what the social workers see; therefore, the social worker has got busy and has proposed a remedy. What do we do? We try to thwart it.

The Sheppard-Towner bill is not what we prefer or favor; therefore, instead of taking half a loaf, we refuse bread. We refuse appropriations if the money does not go where it belongs. If it is not done by the state, it is helped by the nation, therefore it is bad legislation and we will refuse it.

Again, we have the name of not being progressive. We must welcome these statistics, however bad they are in form, on prenatal care. The President and apparently the Senate are feeling the pressure of popular opinion brought to bear on a measure which we are not in touch with. We teachers, we professors, are disappointed. I confess myself I am one of the most disappointed men that ever stood on his feet in such an assembly. For nearly twenty years I have tried what little I could do to leaven the mass of the obstetric work of the general practitioner, to raise that level. Gentlemen, whatever progress we have made in our maternities, we have failed to raise that level. Let us then in God's name welcome any outside help, however mistaken, for social health insurance and all that are inevitable. We cannot stop it.

DR. J. WESLEY BOVEE, WASHINGTON, D. C.—A great many years ago we had a definition of obstetrics by Dr. Goodell, ''a fellow feeling for a human being.'' We have seen it emphasized here today I think to an alarming degree.

I want to speak, however, in opposition to the plea suggested by Dr. Pomeroy and of Dr. De Lee of treating patients as they wish. I hold that a patient should be treated as judgment dictates; that we should act as practitioners of medicine instead of those who cater to the wishes of our patients.

DR. JOHN A. McGLINN, PHILADELPHIA.—Not long ago in this Society, I remember it was considered criminal to stick a hand into the vagina, although it was gloved. We had to stick the finger up into the rectum. Cesarean section should hardly ever be performed unless total hysterectomy was done. Still at the present time, in cases of normal delivery we have to do podalic version to get the whole arm into the uterus. To shorten the pains of the second stage of labor, we have to split the vagina and put on forceps, and these advances are good things.

So far as obstetrics is concerned, it is the same as any other problem in medicine. There is a good deal in common sense. You cannot lay down any hard and fast rules how to deliver every patient. You have to individualize, and these problems are individual. Prophylactic version may be the ideal thing in a certain case. Central episiotomy may be the ideal thing in a certain case, but podalic version is not an ideal thing in every case, nor is prophylactic forceps an ideal thing in every case, or central episiotomy. Certain cases will go through spontaneous labor without difficulty, and our problem is to recognize when cases are not normal and apply the proper remedy with our art and skill, whatever remedy that may be.

DR. N. SPROAT HEANEY, CHICAGO.—I take it that we, the audience, are to be the judges in this presentation of briefs, and since the evidence does not all seem to be at hand, I wish to ask for information.

The advocate of one procedure says that the cervix should not be interfered with in any way during the natural process of its dilatation and places all the importance upon the avoidance of laceration of the pelvic floor. Why is the pelvic floor so important while the cervix is unimportant as far as its injuries are concerned, and why should a method be elaborated which concentrates on the pelvic floor and disregards the cervix? If the spontaneous dilatation of the cervix is not dangerous, why is the spontaneous dilatation of the vagina and perineum so full of danger? Dr. Polak has given us some beautiful results to study and I think that we should be interested in the immediate results of labor and until they are impossible of improvement, we should not worry about the late results. A low child mortality is the real criterion as to the superiority of one method of delivery over another, provided the maternal mortality is the same in both instances. Another peculiarity in Dr. De Lee's presentation that I cannot understand is, that he elaborates upon the dangers of the caput succedaneum to the child and says that he avoids this with prophylactic forceps. The question is, since he never interferes with the first stage of labor, whether or not a caput succedaneum only forms in the second stage of labor. We know that it does not, since who among us has not seen a caput succedaneum on children born by cesarean section? This argument then will have to be discarded.

DR. HUGO EHRENFEST, ST. LOUIS, MISSOURI.—Dr. Davis has referred to a fact which is important in this discussion. He would like to have the neurologist testify as to the damage done by forceps extraction.

The neurologist indeed is the one who wants the baby extracted quickly because long-continued compression of the head in his belief is disadvantageous to the later physical and mental development of the child. Unfortunately the obstetrician has accepted this opinion, though as a matter of fact it positively is incorrect. It is based solely on statistics collected in institutions for the feebleminded and insane asylums, by asking the mother of such a feebleminded child whether she had a forceps operation, or whether she had a hard labor. Babies, stillborn after forceps delivery, obviously are not counted at all, and by simply taking the mother's word for it, the large number of those who had a hard labor is not surprising. Actual evidence now available proves beyond any doubt that intracranial damage is due rather to quick compression, to quick and excessive molding than to continued compression. This evidence has been supplied by obstetricians who have followed up their own cases and have compared end results with the exact history of the labor ten to fourteen years ago. Such investigations proved beyond any doubt that all procedures which hasten the passage of the child, and which cause quick and excessive molding, such as the use of pituitrin, of forceps or breech extractions, are more likely to be responsible for intracranial injuries manifesting themselves only later in life than merely a long labor.

DR. CARL HENRY DAVIS, MILWAUKEE, WISCONSIN.—As it has a definite relation to this obstetric symposium, I wish to report the results of a recent questionnaire sent to twenty members of this Society.

Last winter a surgical colleague asked me to examine his wife, a para ii, who had been delivered of her first baby by cesarean section because of a central placenta previa. She wished to go through a normal labor. He wished to know if this were safe since she has a normal pelvis. I went over the situation with the husband as regards the probabilities in the case, and gave him the results of my study of the literature. In addition, I sent a questionnaire to twenty members of the Society, stating briefly the facts and outlining a possible plan of management.

In answer to the question, "Do you favor the dictum,—once a cesarean, always a cesarean?" 13 out of 20 answered "No"; 7 out of 20 answered, emphatically "Yes"; 13 out of the 20, with more or less qualifications, favored giving this woman the test of labor, while 7 were opposed to any test of labor. The husband in going over the situation with the family and the two surgeons with whom he is associated finally decided that in view of the wide difference of opinion among experts, cesarean section should be repeated.

On the 16th of May the patient was delivered by the surgeon who performed the first section. It was found that for the most part there was a good scar, but at the upper angle of the old scar there was a very thin area about the size of a quarter. The scar was excised, the uterus again sewed up carefully and it is believed that she can go through a subsequent pregnancy with relative safety. She probably could have gone through this labor spontaneously, but with such a marked thinning of the uterine scar at one end, with a third pregnancy she might have had an early rupture.

Will Dr. Polak tell us whether or not in his private practice the number of operative deliveries are proportionately low? I judge that his statistics are from clinic cases, which, of course, do not correspond to cases specialists see in private practice.

DR. HAROLD C. BAILEY, NEW YORK CITY.—If we are to reduce our infant mortality, we must go back to the autopsy room and follow up the head cases where there is cerebral hemorrhage. In 100 consecutive cases in which the head was opened, nearly 50 per cent were spontaneous deliveries; 9 were forceps deliveries, and 6 were versions or breech extractions. The 50 per cent going on to forceps or breech extractions were operative deliveries for dystocia. Over 50 per cent with cerebral hemorrhage were spontaneous deliveries.

DR. FRED L. ADAIR, MINNEAPOLIS, MINNESOTA.—In following up the causation of hemorrhage in the newborn it has been found associated with delayed coagulation time and delayed bleeding time in most cases; therefore, we will have to record a considerable proportion of these hemorrhages as not purely obstetrical but associated with certain underlying blood conditions which can be readily corrected by appropriate therapy.

DR. RUDOLPH W. HOLMES, CHICAGO (closing on his part).—The one great thing that I tried to picture in my paper was that modern obstetrics has not produced the diminution of maternal and fetal mortalities which was promised; that I felt the recent tendency of considering all pregnant women in a pathologic state, necessitating radical intervention, contributed to our failure. Further the oft repeated statement that "this paper is prepared for the purpose of presenting a new operation for specialists," is far from the mark; any physician has the right under the law and his conscience to attempt it. As a result, too often an unwise recommendation is promiscuously accepted. All the cults of modern obstetrics have their adherents: what one man may accomplish by exceptional skill is more than offset by those who fail in a refined technic and dexterity. The modern general trend in operative obstetrics has not benefited the woman or the unborn child. It is time that what is privately conceded to be the fact should be publicly decried.

I regret that I have stultified Dr. De Lee's intelligence by my statistics, but death is the completion of all things for the individual; the concrete evidence that the percentage mortality in hospital now is directly comparable to a hundred years ago deals with plain facts.

If Dr. Harris does not like my figures he must go to Julius Levy of the Infant Welfare Department of his own state, for he made the investigation concerning the

midwife practice of Newark. I know the fallacy of figures, but if we concede the old statistics quoted were wrong then we must concede the recent figures are wrong; if one is right we have equal justification in accepting the others.

I stand back of what I have written; I am merely opening the trail so that others may pave the way, that we may have conservation of mother and child which is to be attained, not by operative intervention routinely, but by truly scientific investigation into the causes of maternal and fetal deaths, and furnish an adequate preventive measure or measures. If all women having passed through a normal confinement were required to have gynecic operative repair to correct the injuries of labor, then it would be a timely thing to devise routine operative means to consummate delivery without those ravages. But so long as it is merely the incidental woman who demands operative correction of traumatism of birth a routine obstetric operation of some sort or another is a great mistake, and does not correct or mitigate the many evils of labor—on the contrary, unwise intervention increases the risks.

As I see it, the progress of the future in obstetrics is coming from the development of knowledge of antenatal pathology, the correction of diseased states in the fetus by scientific prenatal care and therapy. Who knows but that a refined gestational care may eliminate pelvic deformities in the fetus so that the future woman will be born with normal pelvic structure, and therefore will mature anatomically and obstetrically perfect. Endocrine pathology is of moment in obstetrics today; the future will show that internal secretions have an enormous import in the normal physiologic maturation of the fetus; disturbed, they abound with possibilities in the causation of what kills so many infants, "congenital weakness."

For many months I have asked each and every pregnant woman who came to me how many of her friends prevented conception from fear of labor, and one only had a friend who inhibited the possibility of a family on this ground. Selfishness and economic problems are more important in this connection than any assumed fear.

DR. JOHN O. POLAK, Brooklyn, New York (closing).—My paper has brought out the discussion I had hoped for, and apparently all of us are absolutely agreed, but, it seems to me, we are looking at this matter from different angles. We are specialists. Therefore, we can give these women something that the general practitioner cannot give them, and we do it, but we have no right to teach our students in the face of such statistics as have been brought forward resulting from the plan of aseptic expectancy, and interfering only where there are definite indications, that De Lee's method or Potter's method or anybody else's method is the thing to do. We have no facilities in any medical school in this country to teach that sort of obstetrics.

I have the highest regard for Dr. Potter and his work. I have seen his work and am familiar with it. I have learned to do version better by reading what he has written and seeing him do it. He has included in his method everything that is worth while in version, but it is going to do harm and cost numberless babies' lives if we as a Society say this is the plan to teach our students.

I will answer the doctor's question by saying no, my statistics are taken from the cases as they come to us in the clinic where they have had thorough prenatal work. My private operative incidence is very much larger than that reported, for not only are the majority of my cases pathologic, but I am doing what Dr. De Lee and Dr. Potter are doing, I am endeavoring to give every woman the benefit of a relatively painless labor in the hands of a specialist by individualizing the cases.

DR. FRED L. ADAIR, of Minneapolis, read a paper entitled **A Comparison by Statistical Methods of Certain External Pelvic Measurements of French and American Women.** (For original article see page 256.)

DISCUSSION

DR. HUGO EHRENFEST, ST. LOUIS, MISSOURI.—The paper as presented by Dr. Adair does not give one any adequate idea of the immense amount of work that was involved in its preparation. I regret that Dr. Adair did not have an opportunity to bring out the value of such painstaking care in correctly tabulating findings. I always have been interested in the problem of pelvimetry, but can add very little of value to the subject. Dr. Adair quotes me as having said twenty years ago that external pelvimetry is not of very great practical value to the obstetrician. I have not changed my opinion very much since then. However, pelvimetry has outside of its limited obstetric value also a specific value for the determination of the shape of the pelvis. There are definite racial differences in the shapes and sizes of pelves, and Dr. Adair has added to our knowledge from that point of view. The anthropologist attaches, however, more value to pelvic inclination than to pelvic measurements, and I am sorry Dr. Adair did not give us some information concerning variations in pelvic inclination in the large number of cases he studied so thoroughly.

Another factor which militates against the anthropologic value of these studies is that Dr. Adair speaks of ''American women,'' and at the same time acknowledges that they represent a mixture of races and nations.

As to the obstetric application of his findings, I personally feel that the problem of pelvimetry, as a rule, is not properly understood. The obstetrician, usually not a good mathematician, attempts to solve an equation which contains only one known but at least three unknown factors. The four quantities required for the solution are: the size of the pelvis, the size of the fetal head, the degree of compressibility of the head, and the force available to press the head through the birth channel. The obstetrician in general lays all the stress on that one factor of the pelvic dimensions. Some efforts have been made to determine the size of the fetal head. The obstetrician, however, has no information concerning the factor of compressibility of the head and cannot forsee the amount of expelling force that will be available.

I may add that there is a very interesting relation, from my point of view, between the anthropologic and obstetric aspects of the female pelvis in this country. We do know that most races have their characteristic pelves, small or large, and that in the new born infants the cephalic diameters are proportionately smaller or larger in the same ratio. There is a definite anthropologic relation between the size of the fetal skull and the pelvic dimensions. I do not think that enough stress is laid on the incidence of obstetric complications that arise in this country as the result of the mixing of races in marriage.

DR. EDWARD P. DAVIS, PHILADELPHIA.—This is a valuable scientific communication, but let us bring it down to what we can actually do in teaching. External pelvimetry and palpation of the pelvis externally are valuable in calling the attention of the medical student to disease in the mother's skeleton and to rickets. A rickety mother will often have a rickety baby, and intrauterine rickets has occasioned many serious complications in labor.

As to the use of the x-ray in connection with this work, Dr. Manges of the Jefferson Hospital, Philadelphia, a recognized authority in x-ray work, at my suggestion has made a careful chart of the normal pelvis. He can x-ray perfectly the average pelvis. He can x-ray the pelvis in a given case and by comparing the two by his own method he can give the absolute measurements of the pelvis.

There is one method to which I wish to call attention. Take a sheet of lead of convenient thickness and cut a ribbon of half an inch, and have it ready when the child's cranium is expelled, and then simply mold that ribbon of lead around the cranium, transfer the lead carefully to tracing paper and make a tracing, and you thus have a measurement of the fetal head. We should, I think, very carefully teach palpation of the head as it descends into the pelvis.

DR. RUDOLPH W. HOLMES, CHICAGO.—Different peoples have different statures: just as statures vary, so do the component parts of the body vary. The Filipinos are small people, and naturally their pelves are small; also, as the babies are small, the fact of the undersized pelves is of small obstetric significance. Filipinos have told me dystocia among their people is rare.

Dr. Ehrenfest mentioned as one of the problems injury to the soft parts. The soft parts have an important part in causing dystocia in pelves of minor contraction. A pelvis of say 9 centimeters might offer insuperable difficulty to the birth of the child, yet that same pelvis dried would permit the given baby to pass through without difficulty.

I was glad to hear Dr. Davis speak of the lead ribbon; it is a valuable contribution in that it furnishes a positive configuration and dimension of the obstetric canal.

DR. JOSEPH L. BAER, of Chicago, read a paper on **Basal Metabolism in Pregnancy and the Puerperium.** (For original article see page 249.)

DISCUSSION

DR. J. C. HOWE, BOSTON (by invitation).—This paper has interested me for its conservative conclusions. I believe that the rise in metabolism is due to two causes. First, the increased amount of tissue metabolized, and second, the possibility that the internal secretions are abnormal in pregnancy. The work of Dr. Murlin has suggested that the rate of metabolism is the same as it is normally. Some of the higher results in the last months of pregnancy, as shown by Dr. Baer, might be interpreted in two ways: First, either the increased metabolism is due to the rapidly metabolizing tissue foods and other products, and second, it may be due possibly to a varying quantity of the internal secretions. The normal basal metabolic rate is quite constant in each individual and varies under the conditions stated by Dr. Baer. There is very little difference unless changes occur in the internal secretions. In the first place, the thyroid increases it markedly. In the second place, changes in the pituitary may increase it to a certain extent, as shown by removal of the pituitary. Following removal there is a drop in metabolism, and, where the pituitary is acting at too great a rate, there is a slight rise. Recently it has been found that the adrenals are also involved, and as the adrenals undergo a change in pregnancy, one might assume the possibility that there might be a change in the rate through the adrenal secretion. However, one must be cautious in interpreting such results as due to the internal secretions, and Dr. Baer's attitude in interpreting them as due primarily to the increased amount of and the rapidly metabolizing tissue, such as foods must be, seems extremely wise.

DR. EDWARD P. DAVIS, PHILADELPHIA.—These very interesting observations recall the early and, I think, adequate explanation for the pernicious nausea of early pregnancy, namely that it is due to excessive development of the syncytium. The statement has been made in this paper and in the discussion that the excessive metabolic activity is due to the fetus, and that persists in pregnancy. The thyroid

is enlarged during pregnancy without detriment. We may correlate these observations in our study of toxemia. It has been shown that maceration of the fetus is followed by a drop in the toxic process, and if the patient gets better in a short time the fetus is likely to, and it usually does, die.

Furthermore, I would like to call attention to the extraordinary results of the recent European war. We are now in possession of the statistics of France and Germany. Eclampsia and toxemia decreased very largely in Germany during the war, in spite of the privations of the population, and this can be accounted for in this way: First, the privations were not as bad as supposed, and second, in many instances the metabolism of woman is extraordinary under very adverse circumstances. There is a common belief that under the stress of war or any calamity the normal relation between the sexes in the fetus would be reversed. The old tradition that there is an increased birth rate of boys in war times has been shown not to be the case at all. In those countries devastated by war the sex relations remain absolutely normal.

DR. COLLIN FOULKROD, PHILADELPHIA.—The literature on metabolism has increased and is increasing rapidly, and I should like to point out the fact that there is one phase of study of this subject that will not only give us light, as Dr. Davis suggested, on the toxemia of pregnancy, but on the food needed by the pregnant woman. We have never had a definite method of recording the metabolism of the pregnant woman, in order to know what type of diet will satisfy her needs.

In a recent issue of the Journal of the American Medical Association, in an editorial reviewing diet in pregnancy, the conclusions drawn are indefinite. I would urge individual studies with particular reference to the nitrogenous elements, creatinin and others, as causes of the toxemia of pregnancy. Toxemia may be due to a loss of enzymic action on part of the mother in protecting herself against enlargement of the uterine muscle. It may possibly be proved that the pregnant woman lacks sufficient enzymes to digest some particular food and hence to protect herself. We may then find out what food is needed to prevent toxemia.

DR. BAER, CHICAGO (closing).—I have nothing further to add, except to point out the fact that until greater accuracy is obtained both in the apparatus used and in methods of interpretation, we are not going to be able to do the class of work the last speaker has hinted at. At present, we have to allow a leeway of plus or minus 10 in rating our cases. I have used the Dubois-Aub table. There are two other methods of expression extant, the authors of which claim that their method is superior to the Dubois-Aub, or the Harris-Benedict prediction tables, and the Dreyer formula.

In an article that has just appeared in the *Archives of Internal Medicine*, in the May issue, Means and Woodwell have analyzed these three methods of expression and find they so closely approximate each other that they recommend the continuance of the Dubois-Aub formula since this is the one most generally in use.

DR. WM. BLAIR BELL, of Liverpool, Eng., read by invitation, a paper entitled **Some Considerations of Unsolved Problems in Gynecology and Obstetrics.** (For original article see page 130, August, 1921, issue.)

DISCUSSION

DR. WILLIAM E. STUDDIFORD, NEW YORK CITY.—I feel that Dr. Bell has brought before us some very large problems which we are as yet unprepared to solve. I quite agree with him that it is necessary to broaden the lines along which we teach our students; that their curriculum is already overloaded, and that there is necessity not only for increasing our clinical facilities, but of combining the clinical

with the laboratory facilities. I believe that our teaching is largely developed along two distinct lines. The laboratory men have built up their own special branches, but there has been a tendency for the laboratory men to get away a little bit from the clinical side. It is the same way with the clinician. While clinicians have utilized the laboratory facilities, they have not always been in distinct harmony, and in the last two years, and especially since the war, there has been a tendency to break down the barriers that have existed between the laboratory and clinical side of medicine. There has also been a tendency to develop "group medicine."

Let us consider some of our obstetric problems. Take the question of eclampsia. It is not a simple problem for the obstetrician. It is a problem in which the internist, the laboratory man, the physiologist, the biochemist, are all interested, and unless we can get a group of men who are proficient in these various lines or working on the problem the solution seems as far distant as it has been in the past; but if we can combine these sources of information, our efforts may result in a solution. It is the same way with regard to many other gynecologic problems. The question of the development of fibroids is not only one for the gynecologist but for the physiologist, the pathologist, and the histologist. All these men should be interested, and it will be necessary to get such a group on the obstetrical service and on the gynecologic service if we are to eventually solve certain problems.

I was very glad to hear Dr. Bell speak of the necessity of having departments of anatomy teach anatomy along special lines. That is an effort I have been making in the last few years, and it has been of great help to the students to get the anatomic department to take up the subject of pelvic anatomy from a gynecologic and obstetric point of view, and not simply teach it as in the old textbooks. The same applies to comparative anatomy, the study of the development of the ovum being combined with the department of biology, utilizing such lectures and such teaching with special reference to obstetrics at the time the student reaches that point.

During the past year the department of biology took our students and elaborated on the previous lectures that had been given in the first two years, and when the class started their obstetrics they elaborated their previous lectures from a distinctly obstetric point of view. In is only by combining our various departments and getting them interested in our problems that a solution seems possible.

DR. EDWARD A. SCHUMANN, PHILADELPHIA, PENNSYLVANIA.—To those of us who live in the atmosphere of the biologic concept of medical problems, Dr. Bell's paper comes as water upon parched soil.

In Philadelphia, under the wise direction of Dr. Charles P. Penrose, we have attempted in a feeble way to solve some of these problems. At the Zoological Gardens in our city, which happens to be one of the larger ones of the country, there is a museum of comparative anatomy, with a paid pathologist and the requisite technicians and assistants. This pathologist has added to the staff of the Zoological Gardens a so-called consulting staff. He has a consulting neurologist, a man who is engaged in the active practice of neurology, a consulting internist, a man in the active practice of internal medicine, a consulting gynecologist and obstetrician. Every animal in that garden which dies is subjected to a most careful postmortem examination, and it is the duty of the staff member along the line of the particular specialty involved to examine and report upon the organs of the animal as they are removed. Furthermore, there are conferences held at the Pathological Society, and those of us who are interested in biology attend the autopsy work in the Garden. Each year an annual report is published which includes the discussions of the various specialists upon the comparative anatomy and pathology of the specific group or set of organs. We not only note differences between groups of animals,

but we observe what might be called the generic characteristics of the various species of animals, and it is the duty of the members of that consulting staff to publish their results from time to time. This work has not yielded as yet very much in the way of results, but we hope for development in the future, and we hope to elicit the interest and influence of a larger body of the medical profession in spreading this system of education to the other zoological gardens of the country.

DR. EDWARD P. DAVIS, PHILADELPHIA, PENNSYLVANIA.—Our education at present, it seems to me, has outgrown the interest of operative teaching and is somewhat weak, as has been so ably indicated by Dr. Bell. The slogan of teaching clinically is largely responsible for this condition of affairs, and so far as obstetrics and gynecology are concerned, we certainly need to revert as well as we can to the broad principles enunciated by the essayist to whom we have listened. He has indicated some of the most important clinical problems of obstetrics, not only in our studies of the question of toxemia, the condition of the blood in pregnancy, but also in lactation. Lactation is neglected in the study of obstetrics and in the teaching of obstetrics to medical students, and there is abundant evidence that lactation is a complex process; that it is one of those blood crises incident to parturition which throws valuable light upon some other conditions, and that the wellbeing of the mother and oftentimes the wellbeing and life of the infant may depend upon an intelligent appreciation of this fact. For instance, we are familiar clinically with the fact that in some cases of unexplained fever after birth, that in some cases of abnormalities in lactation the administration of the extracts of the ductless glands will bring about a happy solution of the pathologic condition. So in preparing pregnant women for successful lactation it is quite likely that we may yet, and very soon, evolve indications from a comparative study of the blood and in some cases administer extracts of the ductless glands with great benefit.

I think the numerous suggestions made by the essayist are exceedingly valuable. One which comes to my mind is especially timely, namely, so far as the teaching of obstetrics is concerned, the question of not laying so much stress on mere technic and possibly the performance of operation, but by leading the student through biology, comparative anatomy, biochemistry, indicating to his mind that the parturient woman is a complex individual, and that the larger part of her physical prosperity and that of her offspring will depend upon a close study of physiologic phenomena. Moreover our scientific knowledge must be utilized to remedy any defects or difficulties which may arise in the physiologic and anatomic condition of the mother and the child.

DR. JOSEPH BRETTAUER, NEW YORK CITY.—I feel that very few of us can discuss Dr. Bell's paper as intelligently as we would like to. The suggestions he has thrown out are so clear and yet so difficult to be made use of, that I for one feel it requires a different basis than the one we have to carry out work along the lines laid down by Dr. Bell.

There are two distinct principles on which teachers of medical students ought to act. We must not lose sight of the fact that we have not only to teach students and the younger men to be helpful in practice, but we have to teach them how to treat a sick woman. A man of average intelligence can be taught how to treat a sick woman. The average student, however, cannot be taught to do the work which is required to follow this line of research. It takes a man with more than the average intellect or average brain to carry out the work of this kind. Biochemistry is one of the most difficult subjects which the younger men can study and very few will become really efficient in it. If you look over the membership list of a chemical society or a society of physiologic chemists as they call themselves now, you will find among a membership of 150 to 175 scarcely half a dozen, possibly one or two more, who have done real original work in this line.

I happened to be present at the discussion of a subject which was far beyond me. In that discussion one of the real pathfinders complained that he could not find young men to carry out that sort of work; that it could only be done in institutions which are amply supplied with funds. Therefore, I do not think the ordinary clinic, which has not at its disposal a fully equipped laboratory, can undertake this work. When I say a fully equipped laboratory I do not mean simply a microscope, the various histologic appliances or even chemical appliances, but a biochemic laboratory, which means an enormous outlay. I think it is special work which will never be done in conjunction with any obstetric or gynecologic clinic. It must be done by men who do nothing else. Of course, it is entirely different with comparative anatomy. We are fortunate enough to have among us a man who has done a great deal in that line, and he has certainly taught his students more of special anatomy than the usual anatomist does.

To repeat, I am sorry to say that while it is most likely this subject will receive proper attention and direction in the future, yet at present, I think the average student will not be able to follow it.

DR. BELL, LIVERPOOL, ENGLAND (closing).—I am grateful to the gentlemen who have spoken for their kind words concerning my work and for expressing their views in the matter I have brought forward. It was with considerable difficulty that I made up my mind as to the subject I should discuss before this Society. Finally, I decided on a difficult problem that has been a matter of the greatest interest to me all my professional life. When I was a student little biology was taught, and in going about I find very little is being taught today. My research work has been chiefly along the lines of biology and embryology, mostly straight-forward biology.

Today there is a tendency toward ultraspecialism, such as the specialization in regard to operations, yet we know that in considering gynecology and obstetrics we have to consider the whole woman. Gynecology extends far beyond the limits of the pelvis.

I was interested in the remarks of Dr. Schumann regarding the anatomic and pathologic work being performed at the Zoo in Philadelphia. Many of the interesting articles of Bland-Sutton were based on information gained while he was making pathologic investigations at the Zoo in London. There he did splendid biologic work when he was a young man.

There are many things of interest in regard to the anatomic conditions existing in animals, for instance, in the lemur. I have found that there is a natural state of exophathalmos and that the thyroid gland in this animal has the same appearance as that seen in the human subject suffering with exophthalmic goiter.

(*To be continued in October issue.*)

OBSTETRICAL SOCIETY OF PHILADELPHIA
STATED MEETING, FEBRUARY 3, 1921

THE PRESIDENT, DR. JOHN A. McGLINN, IN THE CHAIR

DR. EDWARD P. DAVIS read a paper entitled **Induction of Labor, Complicated by Hemorrhage**. (For original article see page 1, July, 1921, issue.)

DISCUSSION

DR. W. R. NICHOLSON.—I believe that Dr. Davis is right in saying that we do not get as prompt action from the tube as from the bougie. I have ruptured more

membranes with the rectal tube than with the bougie. As for the indication for the use in case of hemorrhage it seems to me that the individual cases that Dr. Davis has spoken of were handled by the use of the bougie and then by the cesarean as they should have been handled, but the question comes up as to the proper handling of the cases with hemorrhage from placenta previa and premature separation of the placenta. Of course as far as the second indication is concerned, there is nothing to be said about the section, but with placenta previa the question of delivering by the vagina or by section must be considered. I have had one rather unpleasant experience in the type of case Dr. Davis mentioned, that was in a woman, unfortunately in the country, where these things seem to happen more frequently than in a hospital where one is prepared to handle them, and I introduced a rectal tube and got a hemorrhage which was very disquieting. I presently withdrew the tube and the woman went into labor without any further interference, but I felt at that time that I had introduced the rectal tube up to the edge of the placenta.

DR. RICHARD C. NORRIS.—The induction of labor is a very valuable operation. From the standpoint of the indications I agree with Dr. Davis, and personally would extend them. I find as years go by I am more and more prompt in the induction of labor in primiparae with floating heads at term, especially occiput posteriors. As to the technic it is very important to know the best method for the induction of labor. We are not prepared to say how the introduction of a foreign body into the uterus brings on uterine contractions because we do not absolutely know as yet what produces labor naturally at the full period of gestation. The more we see of the use of pituitrin the more prone we are to believe that the pituitary body is an important factor. The more we learn about the action of pituitrin, the more we realize there must be some other stimulant to initiate contractions before this gland seems to come into efficient action. Its efficiency seems greatest during the second stage of labor. As I view the situation and realize that bags have been more prompt, in the experience of most men, in bringing on labor pains than bougies placed in the upper uterine segment, I have become more and more convinced that irritation of the lower segment is the important factor and with that idea in view I was one of the first to use the rectal tube, endeavoring to have it coiled up in the lower segment. My aim was to make the rectal tube a substitute for the bag and have it of such character and bulk that it would become more and more analogous to a bag and for years I have not used a tube with the idea of passing it well above the lower uterine segment. When I used one or more long bougies I passed to the fundus and sometimes saw slight hemorrhages. Dr. Nicholson has referred to the old form of bougies. I think that success is dependent upon the type of rubber tube you use. It should be very soft, long and flexible. Where the tube is coiled in the lower part of the uterus on itself then the bulk of the tube becomes equivalent to the bulk of the bag. The tube is almost equally efficient and it can be introduced when the bag will often require an anesthetic and preliminary dilatation of the cervix. If one wants to bring on pains more promptly I would use a bag. The insertion of the tube is facilitated by a stylet passed within the tube as far only as the internal os. The tube is pushed off the stylet into the lower uterine segment. The portion of the tube within the uterus is always free from the stylet. In the induction of labor we should aim to irritate the uterine segment by a mass as large as we can reasonably and conveniently make it. Since pituitrin has come into vogue, we have not hesitated to add small amounts of pituitrin, never more than two or five minims, and by analyzing our cases we found that the onset and progress of labor were aided by the judicious and skillful use of pituitrin. I think, briefly, it is dangerous in the hands of an obstetrician without proper judgment. Small doses are invaluable in the induction of labor after the tube has been in place for several hours, of used with proper restrictions.

Dr. Davis' paper, I think, has limited the indications for induction somewhat. The technic he advocates I would modify, as suggested, in order to increase efficiency without multiplying dangers.

DR. GEORGE M. BOYD.—I am in accord with Dr. Davis' views in regard to the indications for induction of premature labor, although in my hands the operation does not go along as smoothly as has been described by many authors. I do not find that labor always begins promptly and continues uninterruptedly. There is an element of danger of infection. The purpose is often defeated by the rupture of the membranes. That has been my annoying experience in several cases where I have used the bougies. To eliminate the possible danger of infection I have recently resorted to dilatation of the cervix manually, under ether, stripping the membranes and packing the cervix and lower portion of the uterus with gauze. The advantage of the method is that it carries out about what a soft bougie usually accomplishes and you have a method of induction which you can feel is a cleanly one.

DR. DANIEL LONGAKER.—In regard to the operation of induction of labor complicated by hemorrhage, I have used the bougie, rectal tube, and bag in a large number of cases. I have never in the use of the bougie seen hemorrhage that I considered at all alarming. If there is bleeding of any moment, the membranes should be ruptured first and either let it go at that or put in the bag. Regarding the bag, the larger the bulk, the better. There is nothing that will accomplish this so well as the Voorhees bag. The bag I use more than any other is No. 4 which holds eight ounces of water. Regarding the technic, the patient is placed in the exaggerated lithotomy position at the bottom of the bed, the perineum is retracted by means of a large Sim's duck bill speculum, the anterior lip is seized by ring forceps and likewise the posterior lip, the canal can be asepticized or sterilized by the dry method, $3\frac{1}{2}$ per cent iodine following alcohol as a dehydrating agent. The No. 4 bag can be rolled up like a cigarette, grasped, anointed and slipped into any cervix just as easily as the bougie without touching anything whatever in a perfectly satisfactory aseptic manner. The results of this method are I think far more satisfactory than any I have ever seen following the use of the bougie or rectal tube.

DR. BARTON COOKE HIRST.—I would call attention to the method of procedure at the University Hospital. We dilate the cervix 7 cm. in a linear direction, insert a two-inch bag of my own model, which is superior to the Voorhees bag as it dilates the cervix in the horizontal plane, does not elongate it, and does not displace the presenting part. Labor usually ensues promptly.

DR. EDWARD P. DAVIS (closing).—In the cases narrated there was no sign or symptom of hemorrhage before the insertion of bougies. These cases were in no sense cases of pregnancy complicated by hemorrhage before the induction of labor. The paper was written to illustrate the fact that in the induction of labor, hemorrhage may develop which might naturally be ascribed to the induction of labor, but which had nothing to do with the operation itself. When such hemorrhage occurs during the induction of labor, it is a complication of importance and the cause of the hemorrhage should be ascertained as promptly as possible. In the case in which cesarean section was done, the operation was not performed because of hemorrhage, or because bougies had been inserted, but for the reason that when the abdomen was thoroughly examined after the insertion of bougies, there was evidence that the placenta had partially separated and that separation was still going on. This diagnosis was confirmed at operation. The bougies had to do with this condition only in so far as they excited uterine contraction, and it is more than probable that the placenta would have separated in this case whenever the

woman went into labor. It is certainly fortunate for the patient that the uterus which showed chorioepithelioma was removed.

In considering the induction of labor, one cannot apply any method to every case. The condition of the pelvis, cervix, birth canal, nervous system and fetus must be taken into consideration. A very rigid cervix may require a vaginal section, but if this be declined, in my experience, the introduction of several bougies and the use of morphine afterward will give best results. A reasonable time is of no especial importance.

If, however, the cervix is soft, and one wishes to proceed with the minimum of pain, a rectal tube made of French rubber, which is very smooth, is best. These tubes are so flexible that they may readily be coiled in the lower segment, where they will excite uterine contraction. In my experience, the bag causes the patient great pain, may displace the presenting part and is not superior to other agencies.

It is important that the induction of labor should be done under transient but thorough anesthesia. This permits a thorough examination of the case, considerable dilatation of the cervix, and the accurate insertion of the bougies. We should not, I think, resort to the induction of labor, except in rare cases, without anesthesia. Unless the patient is toxic, nitrous oxide and oxygen are satisfactory.

Dr. WILLIAM F. MORRISON read a paper entitled **What is the Best Treatment for Retrodisplacement of the Uterus?**

Dr. Morrison said:

In discussing the surgical treatment of retrodisplacements of the uterus I intend to limit myself to that phase of the subject pertaining to the holding of the uterus in its normal position. The necessity of repair of lacerations, curettage, the proper management of tuboovarian complications, etc., we are all agreed upon. In the beginning I wish to state that I have no new operation to offer but to emphasize the value of one old operation in certain types of cases. The possibility of further twists and turns in the round ligaments is not exhausted, however, and there are still opportunities for the aspiring gynecologist to perpetuate his name by describing an entirely new operation or at least modify some of the exhausted ones. We must first consider the support of the uterus, which includes ligaments, intraabdominal pressure and walls of the vagina. When a uterus is retrodisplaced, it is due to lack of the functioning of the ligaments or sagging vaginal walls, either one or both will cause an unequal change of the intraabdominal pressure. While some cases are congenital, others are due to traumatism. We will, I think, all agree that most cases follow confinement or abortion and quite a number are the results of pelvic inflammatory disease.

An operation for retrodisplacement to be of value should possess certain characteristics:

First: It should be without risk to the patient.

Second: It should hold the uterus in its normal position and not interfere in any way with its function.

Third: It should enable the operator to deal with adhesions, tuboovarian diseases and other complications, if they exist.

Fourth: It should not endanger the life of the patient subsequent to operation.

The first of these hardly demands any discussion. While it may be argued that operations after the type of the Alexander, which do not open the abdomen, and operations of the vaginal route, are safer than those which open the peritoneal cavity by the abdominal route, still in the hands of the experienced operator there is so little risk in an abdominal section that it can be discounted in view of the

greater possibilities of correcting all the pathologic conditions. The claim that the Alexander operation should be the operation of choice because of its greater safety is not a valid one and one that does not appeal to the average surgeon. Personally I have not had any mortality in operations for the correction of the displaced uterus and I am sure that this is the general experience of all latter day surgeons.

Practically all operations thus far devised will hold the uterus in a normal position and will effect a cure if the surgeon has the proper conception of the subject and will restore as far as possible all the supports of the uterus and not rest satisfied in simply depending on some method of holding the uterus forward. It is our aim to correct symptoms and restore the parts to as nearly their normal anatomical relation as is possible.

At times failures will result no matter how thorough have been the efforts to cure the condition. Some operations fail more frequently than others, due to an inherent defect in their technic, but some operators will claim that a particular operation is selected because of the entire absence of failure. Of course, I do not intend to impute dishonesty of purpose to any surgeon making this claim. They do it in ignorance of the true status of their postoperative results. In the majority of cases of failures, further advice is sought at the hands of another surgeon and the original operator is not aware of the poor result. At most, if the operation has been properly performed, very few failures result no matter what method of bringing the uterus forward is used. If a round ligament operation is discussed, the discussion usually waxes warm on the question of utilizing the strongest or weakest part of the ligament. At best no part of the round ligament is strong enough to hold a large subinvoluted uterus in normal position. While that part of the ligament nearest the uterus is thicker than that in the inguinal canal, the difference is so slight that to my mind it makes no material difference which part is used to support the uterus. The round ligaments were never meant by Nature to act as true supporting ligaments, and in the normal condition Nature utilizes both the strong and weak parts to serve her purpose. While all round ligament operations bring the uterus in an anterior position, all of them do not restore the uterus to its normal position. Many of them bring the uterus well out of the pelvic cavity and make it an abdominal organ, others hold the organ in a more or less fixed position and do not allow a freedom of motion which it has naturally, while still others bring it so far forward as to make it press on the bladder. As a result these varied conditions produced by the operation, while the retrodisplacement is cured, leave in their wake many symptoms which are at least as annoying as those produced by the original condition.

The operation should not interfere with menstruation or with gestation. If the uterus is brought forward in an abnormal and exaggerated position, congestion is likely to result and the menses will be both profuse and painful. It is very important then to select such an operation as will most nearly restore the organ to its proper position and which will allow a certain freedom of motion. Any operation which will in any way interfere with gestation and labor is to be condemned except, of course, in those rare cases where it is deemed necessary to perform a fixation and where the woman is deliberately sterilized. If the surgeon can be sure that no intraabdominal complications are coexistent with the retrodisplaced uterus and that the uterus is not large, soft, and boggy, then no better operation than an Alexander can be performed. That you can be reasonably sure that no complications exist I admit, but that one can be absolutely certain I question in the great majority of cases. Personally I have been disappointed many times in my diagnosis of a freely movable uterus free of adhesions and with no tuboovarian disease by finding, on opening the abdomen, lesions which I could not recognize by examination and which were not indicated in any way by the history. Because

I cannot have the confidence in my examinations to eliminate complications, I do not mean to intimate that others cannot. The more I see of retrodisplacements of the uterus, the more I am convinced that the true pathology so far as the symptoms are concerned is the pathology of the associated complications. The only way we can be sure that complications do not exist is to open the abdomen and to explore the pelvis. As abdominal surgery, in the clean case, is now practically without risk, I see no contraindication in the selected case to this procedure, and it is my practice always to perform an intraabdominal operation. Each advocate has his cases to report of failures of methods other than his own, in recurrences, intestinal obstructions and dystocia. With the proper type of operation selected in each case, the number of failures would no doubt be few.

Some writers state that from 60 to 100 different operations have been devised for the correction of retrodisplacements. With such a number, is it any wonder we are confused in our selection of the proper one? Which leads us to conclude that various operations, especially those of the round ligaments, are a fallacy.

I do not advocate any one operation for all cases but always approach a case of retrodisplacement with an open mind, having no fixed idea of the particular kind of operation to be performed before the abdomen is opened. In some I find the Baldy operation the best, in others the Gilliam or Montgomery, but in the majority of cases I find the suspension operation preferable. The Baldy operation, unless carefully watched and properly performed, will leave an opening in the broad ligament into which a loop of intestine may be crowded with the resultant intestinal obstruction or, if the uterus is large, soft and boggy, it oftentimes fails in its purpose. Richardson calls attention to this fact and strongly recommends that a suture be placed at the opening in the broad ligament through which the round ligament has been pulled. Nicholson (1919) reports 1233 cases of the Cavallero neoinsertion. He does not, however, state whether these are selected cases but from his writing I am lead to believe he uses it routinely. Montgomery in the *New York State Journal of Medicine*, 1917, recommends strongly his operation, claiming for it that the weakest point of the round ligament is fortified to such an extent that it practically becomes the strongest. This operation of Montgomery's is undoubtedly good in selected cases. He claims that the advantage over the Baldy operation is that there is no chance for hemorrhage or intestinal obstruction, two points well taken. Halford (1919) advocates the Alexander and always tries to cure without an abdominal section. Warlow (1919) advocates the interstitial transplantation of the round ligaments into the posterior portion of the uterus. Polak (1920) advocates a prophylactic treatment; viz., after a curettage or confinement to be sure to replace the uterus. If you fail to do so, then exercises in the knee-chest position and the "Kangaroo walk" suggested by Beck are advised. If these do not meet with success, he advocates a vaginal tampon, the same to be placed in position with the patient in the knee-chest position, being cautions to put the tampon against the cervix so as to push it upward and backward, claiming if the tampon is put in posterior to the cervix, the axis of the uterus is changed. Norman (1920) discourages fixation, reporting an interesting case of gestation following the operation, when labor came on the uterus turned upon itself, the cervix pointing upward and toward the right shoulder. He performed a cesarean section, delivering twins; the band holding the uterus in position was cut, the uterus restored to its normal position.

Various writers report cases of failures and intestinal obstructions as a result of the different operations including the suspension. My experience has been that the majority of cases in the McGlinn Clinic in St. Agnes Hospital have been such as to warrant us in selecting the suspension operation. This we recommend in cases in which the uterus is large, soft, and boggy, a condition found in most cases

of a year's, or longer, duration, the enlargement of the uterus being due to the efferent congestion. In most cases there is an endometritis due to the disturbance in circulation. When an endocervicitis exists, due to erosions or other causes, the cervix is curetted, the cervical canal touched with tincture of iodine, occasionally the cautery is used, a small wick of gauze being packed into the cervix. In my experience I have seen only two failures which can be attributed to carelessness of the postoperative technic. Both cases were ward cases and the resident physician in removing the gauze, was not careful to support the uterus. The traction of the gauze while being taken out, was sufficient to pull the uterus down to such an extent that the sutures were pulled through the uterus.

This operation I consider raises the uterus in the pelvic cavity higher than any of the round ligament operations, and if carefully performed and not brought too far forward to press upon the bladder, is the most satisfactory one for the correction of symptoms. While cases have been reported of failures and a few intestinal obstructions following the operation, I feel as against the other operations it is the one to be preferred.

DISCUSSION

DR. BARTON COOKE HIRST.—I began operating on these cases somewhere from 1886 to 1889, thirty-two years ago I regret to remember. I have been operating on them ever since and my experience, I think, embraces the whole history of the subject. I remember seeing the first ventrosuspension operation in Olshausen's Klinik in Berlin. I have tried practically every operation since. I have been doing the suspension operation for over thirty years and have done the Alexander also for that length of time. I did the Baldy operation for two years and did it throughout as Baldy himself; also the Webster operation, worse than the Baldy, with more failures. For twenty-five years I looked for an operation which would get my patient well and keep her well. For the last seven years I feel satisfied for the first time in my professional career. I have the records, names, and addresses of 250 patients up to last October operated upon by the technic I now employ. I communicated with the first 125 so that some time should elapse after the operations. All the answers were favorable; all that I have been able to examine have shown a good result. The uterus remains in perfect position, although some of these women have had several children. Like the reader of the last paper, I have nothing new or original to present. I have simply combined three operations: suspension, shortening the round ligaments in the groins and utilizing the Pfannenstiel incision. I have practiced the ventrosuspension operation for thirty years so that I know what to expect from it. I can make a statement about the shortening of the round ligaments in the inguinal canal that I think is remarkable. I cannot find a recurrence of restroversion following childbirth after the Edebohls modification of the Alexander operation in all the years I have observed it, that is twenty-eight or twenty-nine years. If it is done properly it is the most successful operation for its purpose. Graves, of Boston, states they have 13 per cent of failures in shortening the round ligaments by the inguinal canal. There must be some imperfection of technic to explain such a statement. The Pfannenstiel incision permits one to inspect and palpate the appendages and appendix.

DR. F. HURST MAIER.—In considering what is the best treatment for retrodisplacement of the uterus, we presume Dr. Morrison refers to its surgical correction.

Although I do ventrofixation for the correction of certain types of uterine prolapse, I cannot see any real worth in the ventrosuspension operation.

After all the factor that probably determines most of us in the selection of our operation is familiarity with a given method. It is the one we do oftenest that we do best.

I personally have had the best results, when the condition is one of ordinary retrodisplacement, with Montgomery's modification of the Gilliam-Simpson operation. It is an intraabdominal procedure. The strongest part of the round ligament is utilized for support and it is carried subperitoneally to its area of attachment on the upper surface of the fascia. No false ligaments are left in the cavity around which the intestines may become strangulated.

It is our practice in doing this procedure to enter the abdominal cavity through a modified Pfannenstiel incision, which gives a large fascial exposure, and permits the suturing of the round ligaments to it without undue traumatization of tissues.

In the presence of a large and flabby uterus, after the abdominal cavity has been opened by a median incision, I usually elect to do the Baldy operation.

In a certain percentage of cases we are bound to have some failures unless we consider carefully in all cases and remember that the real supports of the uterus are not the round ligaments, etc., but the fibrous diaphragm which underlies the bladder, and firmly grasps the upper part of the vagina and supravaginal part of the cervix uteri. When there is relaxation of these supports, we have a beginning descensus added to the retrodisplacement, which requires correction as well as the backward displacement if we expect to obtain a permanent result.

DR. CHARLES P. NOBLE.—My experience, like Dr. Hirst's, goes back to the early days of the operative treatment of retrodisplacement of the uterus. Before speaking of special operations I would like to emphasize the point Dr. Maier made, that the ultimate and most important factor in the support of the uterus is the pelvic floor, chiefly the sacral segment, but including the pubic segment. If the pelvic floor remains defective no matter what operation is done for retrodisplacement we cannot expect to have permanently good results. I thought that had been settled ever since the days of Schulze, whose work was done in the early part of the second half of the last century. So far as the various operations for retroversion are concerned, I have tried most of them. I must confess my surprise at the technic which was recommended by the reader of the paper as being the operation of choice. About 1895, after experience had demonstrated that hysteropexy in child bearing women was followed by dystocia I used the operation which he recommends until I realized that it failed to meet the indications for permanently successful results. If the suspension is done by sewing the fundus, anterior to the middle line, to the abdominal wall, the uterus is not anteflexed, and therefore intraabdominal pressure does not serve to keep the uterus forward. It has that fatal defect. I am quite sure that subsequent operations in the series reported tonight would add largely to the collection referred to by Dr. Schumann of stretched out ligaments which no longer have any function. The Alexander operation has the disadvantage that one does not actually inspect the condition of the pelvic organs. Nevertheless I have done that operation for many years, and I would say with Dr. Hirst that the results of the operation have been eminently satisfactory. I am prepared to admit the possibility that one can make a mistake in diagnosis and overlook an existing quiescent salpingitis, nevertheless my experience has been satisfactory. It is a fact that I have used great care and discretion in selecting the cases; namely the Alexander operation was never done when there was a history of infection, and it was never done unless the uterus could be replaced bimanually and the appendages showed an entire absence of thickening. In other words, unless one could reasonably exclude infection and even though one made a mistake and operated in some cases where there may have been infection, in none of them was there any subsequent trouble. The technic I used was similar to that used by Edebohls, and anyone who learns and employs that technic will have no difficulty in securing permanent results. The Alexander operation is especially indicated when an operation for retroversion is called for in a virgin. When for any reason the abdomen should be

opened, I have found the Simpson operation to give satisfactory and permanent results.

DR. JOHN A. McGLINN.—A short time ago I operated upon a woman who had a complete prolapse of the uterus. She went to a general surgeon and the general surgeon took out the uterus. He cured the prolapse of the uterus to the extent that she has no uterus to prolapse. In our treatment of prolapse of the uterus we cure pathology which is responsible and then we do not care what operation we do to hold the uterus forward. I have done practically all the round ligament operations. I preferred the Montgomery operation until I found two cases in one week, failures; cases done by himself. In doing the Baldy operation I have met with the same difficulty, also in the Coffey operation and the Gilliam and I found myself doing a large number by the discarded ventrosuspension. Sometimes I do the operation Dr. Hirst does. I do not think it makes much difference what operation you do provided you do all the work necessary to hold the uterus forward. Comparatively few cases of dystocia have resulted from ventrosuspension and comparatively few cases of intestinal obstruction. If properly done, ventrosuspension results are better than you get in the Ferguson or the Gilliam.

DR. RICHARD C. NORRIS.—I think Dr. Noble struck the key note of the subject when he referred to the correction of the associated pathology. Emmet said years ago if a man knew how to do a good plastic operation on the posterior vaginal wall, a pessary worn subsequently would usually cure retroversion. How about the unmarried woman who has never had any children and yet has retroversion? The trend of modern times is to use the round ligaments and more to secure an anterior fundus. It is the essential principle of the means of keeping the womb anteflexed temporarily or permanently. For the associated pathology, particularly the repair of the lower uterine supports the principles of Emmet are still useful. Those men who use the thicker cornual end of the round ligament to bring the fundus forward are the men most satisfied with their results. Now it doesn't make much difference which method of shortening the round ligaments one chooses. Baldy's operation I repeatedly tried and I gave it up, as other men have. It does hold the ovary up, but you do not have to do Baldy's operation to correct prolapse of the ovary. The two essential principles, good plastic surgery and shortening of the elongated round ligament to produce temporary or permanent anteflexion are the essential principles and the less surgery you have to do to bring that about the better. The Pfannenstiel incision is cosmetic, but what happens when it does get infected? Most of you know. If you can through a small median incision, take out the appendix, shorten the ligaments, and correct ovarian or tubal defects, the small abdominal opening is to the patient's advantage, other things being equal from every viewpoint. Some years ago the popular operation was the Alexander. I still do it when I am sure there are no associated intrapelvic lesions. I found that when one Alexander operation was indicated, there were fifteen that required abdominal section. In the unmarried woman, and where the traumatisms of childbirth are absent, the Alexander procedure is still indicated. In the better class of patients there are many women who have retroversions, who have borne two or three children, and who have relaxed pelvic floors. You have examined them under ether and felt their tubes and ovaries, and you can be certain that they do not have pelvic pathology. In that class after a satisfactory plastic the Alexander is quite a good operation for the man who knows how to do it quickly. The convalescence is more comfortable and it offers permanent results even after repeated pregnancies. Among ward patients pelvic infections are more frequent and section for that reason is usually indicated. For these cases I select the Mayo method of shortening the ligaments because in its results and in principle it more closely resembles the Alexander operation.

Dr. Leonard Averett read a paper entitled **Radical Versus Conservative Surgery in Pelvic Infections.**

The conservation of pelvic organs in operations for pelvic diseases, without thorough consideration of the pathologic changes of the same, and pathologic and physiologic changes as the result of operative procedure, has often been the cause of exchanging one group of symptoms for another. As a result many women lead invalided lives or return for secondary operations, thus taking an additional risk to life in the form of ether pneumonia, shock, hemorrhage (owing to dense adhesions as a result of primary operations), emboli, and various other risks which exist in operative procedures, which the patient escaped during primary operation, and would not be subjected to, had not conservatism been carried too far.

First, we will consider the resection of the fallopian tubes. In tubal infections the ostium of the tube is closed or ciliated epithelium destroyed; the tube thickened, distorted and bound down by adhesions, as a result of which the peristaltic movement is lost. The resection of such a tube only predisposes the woman to ectopic pregnancy. For the few successful pregnancies reported by Chavin, Leguen, Salich, Bullard, Childs and others, by far a greater number of ectopic pregnancies have been reported, and the majority of cases remain with the same or even greater group of symptoms as a result of postoperative adhesions.

In Dr. McGlinn's Clinic at St. Agnes Hospital, we did one salpingostomy about three years go, and five months later we reoperated the same patient for an ectopic pregnancy. The same results have been reported by many other operators.

Bullard reports 145 cases of salpingostomy performed at the Womans Hospital of New York City over a period of twelve years, in which he was able to get the full reports on forty-four cases with the following results: twenty-one entirely relieved of their symptoms; twenty total failures or partially successful; three became pregnant, only one of which went to term; the other two aborted; one at four months and one at six months.

We do not know how many of the remaining 101 cases remained invalids, or had to undergo secondary operations, either for relief of symptoms or ectopic pregnancies, and how many had babies.

Summing up the forty-four cases of which data were obtained, we find one successful pregnancy, for which twenty women have undergone an abdominal operation without any beneficial results.

In the December, 1920, issue of the *American Journal of Obstetrics and Gynecology*, Dr. Childs of New York, reported seven successful pregnancies as a result of conservative surgery on the fallopian tubes. I am sure, had he been able to follow up all of his salpingostomies and noted the end results, he might not have been so eager to preach conservative gynecology.

There are some occlusions of the fimbriated end of the fallopian tubes as a result of outside causes, such as, appendicitis, colitis, pressure from tumors, or other extratubal inflammations, in which salpingostomy may be successfully done, by gently breaking up the adhesions and passing a probe through the tube, into the uterine cavity. But even then, the passing of the probe tends to injure the ciliated epithelium and at times sets up intratubal inflammations.

With the advance of surgical science, making laparotomies a reasonably safe procedure, the pendulum in surgery of the ovary has swung to both extremes. At first, healthy ovaries were sacrificed with the expectation of curing all female ailments, particularly various psychoses and epilepsy.

That the ovary produces an internal secretion which influences the trophic and nervous mechanism of the female, was not known and it was believed that the only function of the ovary was that of ovulation. Therefore, if the tubes were so

diseased as to prevent pregnancy, ovaries but slightly diseased were entirely removed. I am sure that this form of surgery need not be further discussed. The pendulum has long left this point, but unfortunately, has swung to the other extreme.

The practice of resection of the microcystic ovaries is a procedure which should be greatly discouraged and the reason is perfectly clear if we study the etiology and pathology of this condition. This type of ovary is found practically in all cases of retrodisplacement of the uterus, when the displacement has existed for a number of years. As a result of chronic congestion there is a thickening of the ovarian capsule, which prevents the rupture of the graafian follicle through the surface of the ovary. There results then a number of retention cysts; at first, limited to the surface, but eventually, studding the entire ovary. The ovaries, as a result of formation of retention cysts, increase in size and weight and prolapse into the posterior culdesac, where they are subject to pressure (on account of their abnormal position) from the full rectum and displaced uterus, giving rise to considerable pain and tenderness in the pelvis.

To resect an ovary of this type, is only adding insult to injury. It is impossible to remove all the thickened capsule so that the part remaining has just as thick a capsule as before operation. The mere handling of the ovary during operation causes sufficient irritation to further thicken the capsule of that portion which is left behind. We further injure these ovaries by producing in them a large amount of scar tissue. As a result, we do not cure these cases, but in the majority of them, the condition, if anything, is made worse.

This observation has been frequently demonstrated in St. Agnes Hospital, both in our own cases and those of other operators, where we were compelled to do a secondary operation for the removal of the portions of the ovaries which were left behind in a previous operation.

Our procedure is not to resect these ovaries, but simply puncture those cysts which are upon the surface, with as little handling of the ovaries as possible. While the condition is, as a rule, bilateral, still one ovary is usually in sufficiently good condition to be preserved in its entirety. Where an ovary, from the widespread condition of the disease, is not amenable to this treatment, we remove it.

The associated pathology is cleared up. If the uterus is displaced, it is restored to its normal position. If this procedure does not restore the ovaries to their proper position, they are brought into proper position by a suitable operation. Since we have been following this procedure, we have not had to reopen a single abdomen for the removal of the ovary so treated.

Much has been written on the conservation of ovaries for their ovarian function and influence of ovarian secretions on the female; but very little has been said of the clinical behavior of the conserved ovary.

Now, let us consider, what is the end result of ovaries retained after hysterectomies for inflammatory diseases of the uterus and fibromyomata of the uterus. We know that in inflammatory disease of the uterus, we have as a result of continuity, a cicatricial thickening of the ovarian capsule, which prevents normal maturation and rupture of the graafian follicle, hence, the formation of retention cysts; increased weight and prolapse of the ovary. Circulatory stasis of the ovary in fibroid tumors of the uterus, likewise results in thickening of the ovarian capsule. The added disturbance in circulation which results from the removal of the uterus, also helps in the pathologic changes of these organs. Such an ovary, if conserved, undergoes extra congestion of the premenstrum and leads to increased tension within the ovarian substance, giving rise to pain, vasomotor and nervous disturbances, in some cases, a week before the menstrual period, and the congestion not being relieved

owing to the absence of menstruation, the above symptoms are continued, at times, for a week longer.

Dr. J. O. Polak, of Brooklyn, reports 73 cases which he had to reopen for painful, cystic ovaries, within five years of the first procedure; and after removal of these ovaries, the patients fully recovered; pain subsided, and flashes were controlled by ovarian extract.

The advisability of retaining the uterus after bilateral oophorectomy or salpingo-oophorectomy in inflammatory disease has been advocated by some operators, on the ground, that by removing the uterus the vagina is apt to prolapse.

We know, of course, that the disease of the uterine adnexa, with few exceptions, is secondary to intra or perimetrial disease. The retained, infected uterus keeps up the disagreeable and troublesome leucorrhea, the uterus may become retrodisplaced and give rise to numerous symptoms and last, but not least, toxic and bacterial absorption occurs from an infected organ which acts as a source of focal infection. The toxic and bacterial absorption takes place through the lymphatics of the uterus. The lymphatics of the cervix uteri empty into the sacral and superior iliac glands. They start as minute pin points in close contact with the racemose glands of the mucosa; these converge, forming thin wall channels which ascend between the muscle fibers, composing the myometrium and form lymphatic vessels, which lie just under the peritoneal covering of the broad ligament, draining outward; and those from the body of the uterus drain into the lumber glands.

As to the fear of prolapse of the vagina in supravaginal hysterectomy, we know that the pelvic fascia and cardinal ligaments are not destroyed in this operation; and by attaching the stumps of the broad and round ligaments to the stump of the cervix, a high fixation of the stump of the cervix is obtained; thereby, giving good support to the vagina.

Destroying of the mucosa of the cervical stump with the cautery is a very important step in this operation, so as to eliminate all possibility of leucorrhea and focal infection from the remaining cervix uteri.

CONCLUSIONS

I. To counteract the few successful pregnancies as a result of resection of the fallopian tubes, we have by far a greater number of ectopic pregnancies, secondary operations for relief of symptoms, and many women remaining invalids.

II. A microcystic ovary in which the retention cysts have replaced most of the ovarian tissue, should not be resected, but removed.

III. The retention of ovaries after hysterectomy for inflammatory disease and uterine fibroids, is always a focus for possible trouble. The capsules of these ovaries are thickened and the added circulatory disturbance as a result of the operation, tend toward cystic degeneration, causing severe pain and trophic disturbance. The life history of the retained ovary is of short duration and the trophic influence of the diseased ovary has been overestimated.

IV. After a bilateral oophorectomy or salpingo-oophorectomy the uterus is a functionless organ giving rise to further pathology if retained.

DISCUSSION

DR. RICHARD C. NORRIS.—The ideal surgeon will preserve function and not destroy it. To those who view this subject with a more or less sentimental view of the situation the ideal would be to preserve the womb, the ovarian function, the reproductive powers, intact, and even to preserve the menstrual flow for its possible endocrine and its psychologic value. These are the ideals. The tendency of the operator today is to be not only a surgeon, but a sociologist, physiologist and a

psychologist if you choose, and try to leave the patient in the best possible condition to meet these three important functions by conserving all her organs. Restricting my remarks largely to the inflammatory diseases of the pelvis, which comprise the greater number of our ward cases, we have to approach the subject from a viewpoint somewhat different from that of our private patients. We may wish to be a sociologist, physiologist and psychologist, but we must realize that at least 75 per cent of our inflammation cases are of gonorrheal origin. Add to these the grossly destructive lesions of serious puerperal and postabortal infections, and the opportunity for conservation of one or more functions is not so great as we find in the various tumors and less virulent infections. The age of the patient, the parity, the prospect, if she is an unmarried woman, of marrying and desiring children, the disastrous effects upon the neurasthenic of destroying ovarian function and finally the degree of destruction by the lesion will often justify in particular cases conservative surgery. My experience is that the most unexpected things happen after our attempts at conservative surgery. You may think the case offers the best field for it. The subsequent history of that case shows that you have gone astray. We have had cases we thought almost hopeless, but because of earnest requests by the patient we have practiced conservative surgery and have been surprised to find that we have preserved all these functions for the woman. For myself I do not let the local lesions wholly decide this question for me. If the patient is a highly neurotic individual I would try to save some portion of the ovaries. It is seldom necessary to remove all the ovarian structures from a pelvic inflammation. The hilum of the ovary can almost always be saved and if we can preserve for the woman her endocrine balance I think we have done a good thing for her. Surgical work on the uterus has lost its terrors as shown by the impunity with which we incise the uterus, stitch it up, and leave it without danger of infection or hemorrhage. Supravaginal hysterectomy has shown us that the mucous membrane of the cervix and the endometrium of the uterine body is not a serious matter as to infection and if we can preserve enough endometrium to keep up the menstrual function, it is wise to do so. In some cases the general nervous condition of the patient renders it most desirable to keep up these functions. Perhaps it is possible to be more conservative in private than in ward patients. When tubes are hopelessly obliterated, ovaries wholly destroyed by suppuration and the uterus infiltrated, conservatism often means complete surgery and hysterectomy is indicated. Our aim should be, and I think the most important item of conservation in the inflammatory cases, the preservation of the endocrine function of the ovary. This means the preservation of its blood supply. You must so operate that whatever portion of the ovary you leave has its blood supply maintained. Otherwise it atrophies and disappears. I have removed and grafted a portion of an ovary in another part of the body to get an adventitious blood supply, but have seen no permanent beneficial results. The surgeon's aim should be to preserve some portion of the ovary. In only rare cases can we hope to save tubes hopelessly damaged, but we find some tubes long after the acute symptoms have subsided which I often split, stitch back the mucous lining, believing in my heart they will be useless, but sometimes pregnancy follows, more often it does not, and sometimes, as the doctor pointed out, an ectopic pregnancy may follow. That happens so infrequently, however, that it should not be put in the balance in deciding whether to preserve for the woman those functions which help to keep her a woman. I would preserve as of first importance the function of the ovary; next the menstrual functions; and last the reproductive function. I would preserve a portion of the uterus when the ovary is retained in order that she might have her menstrual function. I know especially how young women feel when their menstruation has been destroyed. The psychologic effect is tremendous, so much so that psychologists rate it very highly as a means of preserving mental

equilibrium. You must take chances in conservative surgery. The chances are that a second operation will sometimes be required. I feel that often these chances should deliberately be taken and the tendency in recent years is to be less destructive of function in all our pelvic surgery.

DR. EDWARD A. SCHUMANN.—Dr. Averett's conclusions from the academic standpoint are entirely in accord with my own, but from the practical standpoint I, at least, possess no conclusions. Many of the women with pelvic inflammatory disease who come under my care are young, considerably under thirty years, and I think that in each such case where any given procedure has been followed I wish within a year or two that I had done some other thing. That is to say, with every attempt to preserve the ovarian function a recurrence of trouble has disillusioned me as regards conservative gynecology. On the other hand, we are all weary of the repeated visits of those who have had a radical operation with complete ablation. These women are constant sufferers from the surgical menopause and despite all the beautiful comments in regard to lessening of menopause symptoms by ovarian extracts I am skeptical. Some of the women upon whom we practice ovarian therapy will say that they think they possibly had a few less flushes than before they took the extract. I have never seen these drugs cause symptomatic cures of surgical menopause. In regard to conserving the hilum of the ovary of which Dr. Norris spoke, unfortunately, the hilum of the ovary has very little endocrine value, consisting almost wholly of fibrous tissue. The secretion of the ovary is developed in the ovarian stroma itself, in the parenchyma. One more point in regard to the elevation of the cervical stump. Bissell discards entirely the suture of the round ligaments into the stump.

DR. F. HURST MAIER.—It is to be inferred that the question at issue is what to do with this particular type of ovarian pathology. With our present knowledge of the part that the ovary plays in the endocrine system our therapy cannot be based on the physical condition alone. The psychic as well as the economic factors enter into it also.

Years ago I learned the lesson of leaving the ovaries in in very young women or women with neuropathic histories. I make it a practice to explain to women, between thirty and forty years of age, who come to see me seeking relief from the symptoms caused by microcystic degeneration of the ovaries, of the value of the ovarian secretion, and that oophorectomy may be followed by disturbances of a general character that may be worse than the local disturbances.

Not infrequently microcystic ovaries are associated with retrodisplacement of the uterus and varicose veins of the broad ligaments. It is both surprising and gratifying what excellent results we often obtain by surgically correcting the displacement and having the patient take several douches of hot saline solution for several months subsequent to the operation.

JOINT MEETING OF THE NEW YORK AND PHILADELPHIA OBSTETRICAL SOCIETIES, PHILADELPHIA, MARCH 3, 1921

DR. JOHN O. POLAK, of Brooklyn, N. Y., read a paper entitled **A Review of 307 Cases of Ectopic Gestation.** (For original article, see page 280.)

DISCUSSION

DR. BARTON COOKE HIRST, PHILADELPHIA.—Some years ago, Dr. Philip Williams investigated my cases of ectopic over a period of ten years to determine

the results of immediate operation in the tragic stage; and second to find out the subsequent history in regard to future childbearing and the likelihood of a repeated ectopic if the unaffected tube were allowed to remain. I have always felt averse to stand idly by while a patient is losing blood, in the hope she will cease bleeding and react and the result of the investigation just mentioned has justified immediate operation in my hands. Of 167 cases, there were 16 operated on in the tragic stage without mortality. In the immediate operation we infuse saline intravenously on the operating table, if necessary, but have a donor ready to give blood subsequently. Actual transfusion is done within twelve hours if necessary; that is, if the patient reacts primarily with salt solution but shortly shows alarming symptoms of acute anemia.

Another reason for immediate operation is that we cannot always depend on reaction after internal hemorrhage or on its spontaneous cessation. I have seen at least a half dozen cases die without operation owing to the continued hemorrhage which never ceased. The next question investigated was the advisability of removing both tubes. Of the 167 women operated on, 7 developed an ectopic in the other tube. We found, however, in this series of cases, that within the next five years there were thirty babies born; so I still shall adhere to the practice of leaving the other tube and ovary undisturbed. I expect to have a certain proportion of ectopic gestations on the other side in the other tube; but, on the contrary, a much larger number of babies born subsequently. So I think that the question should be settled in favor of not disturbing the remaining tube.

DR. E. A. SCHUMANN, Philadelphia.—One point brought out was in reference to the scarcity of tragic cases today. This is very apparent in Philadelphia, and it is notable that the tragic case of the textbooks is apparently growing yearly less common. I had one case of ectopic pregnancy today in Frankford Hospital and one two days before. In both instances, the patient came in with moderate symptoms, suggestive of the acutely inflamed abdomen, rather than a debilitating hemorrhage.

In my own experience, the diagnosis falls largely between ectopic pregnancy and an acute lesion of the abdomen. The most painstaking physical examination often fails to disclose the fact that a given case is one of ectopic pregnancy. In the differential diagnosis, one point only seems to make the diagnosis clear and that is the menstrual history which is so important that I regard it as the point *par excellence* to be brought out. The physical examination is usually not important. In the two cases just mentioned we had never found the slightest sensitiveness in the cervix; yet both had extensive hemorrhage.

Contrary to Dr. Polak, I think bold stimulation together with immediate surgery offers the best chance for recovery. It is my practice to operate on any woman in whom any one can detect a heart beat. So soon as the operating room is ready, the operation is done, and a vein is exposed for blood transfusion or infusion of salt solution or gelatine. A coffee and whisky enema is administered while preparing the woman for operation, and we use the boldest sort of stimulation with strychnia, camphor and digitalis. This plan seems to offer the greatest hope of success. Following the suggestion of Simpson and others, I lost two cases while hoping for the reaction that did not come; and I fail to understand how any surgeon can appreciate when reaction is going to occur, if indeed, it occurs at all. In support of my contention, Dr. John S. Parry, of Philadelphia, in 1879, when morphinization was practiced, found a mortality more than 80 per cent.

DR. JOHN M. FISHER, Philadelphia.—I think that one of the most important points in the diagnosis of ectopic pregnancy is the history of the case. This considered, not infrequently the diagnosis is made before the patient is seen. I am quite certain that every one of you who has had experience in this line will

admit that, every now and then, where an abdomen has been opened disclosing an ectopic pregnancy previously diagnosed as appendicitis or some other intraabdominal condition, you have, upon reading the history more carefully, been chagrined over having failed to come to a correct conclusion originally. I have had this experience. As Dr. Schumann has well said, the basis of interpretation of an ectopic pregnancy lies more in the history than in the physical examination; and from personal observation, I have learned that making a bimanual examination in an unsuspected case of ectopic pregnancy, unsuspected because the history is neglected, not infrequently results in rupture of the gestation sac, with disastrous consequences.

In this connection, I desire to call your attention to three cases in hospital practice recently. In one, the resident, after taking a complete history, became suspicions of the existence of an ectopic; but the chief, who was in too much of a hurry to consider the full details, after making a physical examination, pronounced it a case of appendicitis. A day or two subsequently, the woman was taken with sudden pain and all the evidences of intraabdominal hemorrhage. At operation, the resident's suspicious were confirmed. The other two cases were likewise diagnosed by hospital residents, based upon the histories taken. In the one, the chief came to the conclusion that the woman had a pelvic abscess. A posterior vaginal incision was made to evacuate the accumulation of pus, but it happened to be a ruptured ectopic. The history in the other case also pointed to ectopic pregnancy; and here another chief made a diagnosis of inflammatory disease, basing his opinion upon the physical signs only, but finding that he was mistaken on section.

One thing to which Dr. Polak did not call attention is very important, and that is the difference between the transitory pallor of ordinary faintness and the persistent pallor that attends an internal hemorrhage. A woman faints and, for the time being, presents many symptoms simulating in varying degrees those occurring in connection with an internal hemorrhage. But they are comparatively short in duration. Presently the patient recovers, with a full, slow pulse, with the return of color to her lips and face; while in a ruptured ectopic with toxic symptoms, the pulse is rapid and thready, and the pallor is profound. Although a partial reaction may take place, the pulse fails to regain its former quality and remains rapid for hours, or possibly days, subsequently; and, over and above all, the pallor persists.

With reference to operation in these cases, I myself have always followed the plan of operating immediately, even in the tragic stage. I remove the ruptured tube, and the ovary in connection with it; and then, as Dr. Hirst has suggested, fill the abdomen with salt solution, also introducing a quart into the rectum, and sometimes opening a vein and putting salt solution into it, combined with twenty or thirty drops of adrenalin.

Kindly permit me to repeat that the one thing above all else that I desire to emphasize is the importance of taking a full and complete history in every gynecologic case, because one never knows when one may come in contact with an ectopic pregnancy that may be ruptured by an ill-advised physical examination; and in an old ectopic, in which a rupture has occurred some weeks previously, a diagnosis cannot be made without a carefully considered preceding history.

DR. E. E. MONTGOMERY, PHILADELPHIA.—I have found myself, for the greater part, heartily in accord with Dr. Polak. With regard, however, to the operative procedure, even in these tragic cases, it has been my plan, where the conditions were favorable, to do the operation immediately. In these cases we meet, where the patient is seen in her home following the accident, where conditions are unfavorable for immediate operation, the better plan of procedure is to give the patient the benefit of absolute rest under morphine until she can be transported to a

hospital, where better opportunity will be afforded for operative procedure. In the hospital, however, it has been my custom not to wait; and I can relate a couple of instances which seem to me to illustrate the importance of this.

One of these was the case of a woman who was brought to the hospital while I was operating. The interne came in and told me about it, and he was told to go back to the patient, and I would come as soon as I had completed the operation. I went into the room where he was, and found him practicing artificial respiration on the patient, who was practically dead. You could not feel a pulse, or hear a heart sound; but there was an effort at respiration. I introduced the nozzle of an oxygen tank into her nostril, opened a vein, and proceeded to intravenous injection of salt solution. The patient began a little deeper respiration. We had her taken at once into the operating room, opened the abdomen, and by the time the operation was completed, she was breathing naturally, and she recovered.

In these cases, the only hope is that the stage of depression may be so great that the blood forms a clot in the ruptured vessel and, in that way, controls the bleeding; but we have no security that the increasing arterial tension resulting from reaction will not drive out the clot and cause a recurrence of the bleeding. So it seems wisest to secure the bleeding vessel and take care of the patient subsequently.

Only three weeks ago, I was called to the hospital on Sunday night to a woman who had had an evident tubal abortion; and in this patient the occurrence had taken place very suddenly, and a frightful hemorrhage followed. This patient was subjected to the same procedure as in the other case I have mentioned, and three weeks afterwards she went home, looking as if she had never had such an experience. One cannot but be reminded of the attitude of Meigs, who so graphically described an ectopic-gestation rupture in a beautiful young woman, and tells how the patient died and the autopsy disclosed the hemorrhage that had taken place, and says, ''Where is the surgeon who would have the courage to open the abdomen in such a case and secure the bleeding vessel?'' In other words, such a patient, in his time, was believed to be doomed. It was only the blocking of the vessels by clots that gave any hope.

DR. SARAH H. LOCKREY, Philadelphia.—I think my experience coincides with Dr. Hirst's and Dr. Montgomery's. My method of procedure is to operate at once, especially in tragic cases. Shortly after entering practice, I was summoned hastily, and found a patient of mine dead, sitting up in the chair. She had been out walking and pushing a baby carriage. When she came home, she went to the toilet, told her mother she was dying, and died immediately afterwards from extrauterine rupture.

At another time, I was summoned to a neighbor, and made a diagnosis of extrauterine pregnancy. The patient refused operation, and in two hours was dead. These two cases made such an impression on me that I have never hesitated to operate at once in this condition. This year, in my hospital service, I have not had my usual run of extrauterine cases. In place of these, we have had unilateral pus tubes; and I wonder whether any one else has had that experience this year. Usually, when I go on service, I call the internes together and tell them about the symptoms of this condition, and impress upon them the importance of the history in making the diagnosis. If I do that, I have extrauterine cases; and if not, I do not have them. That proves that the histories of the cases are more important than the physical examination. We often say that we make the diagnosis by telephone.

We find tenderness in the cervix sometimes, but not always. I rely upon the history, and not upon the physical examination. The diagnosis means operation, and as speedily as possible.

DR. CHARLES P. NOBLE, PHILADELPHIA.—So far as the various points raised are concerned, I agree with most that Dr. Polak has said. I was interested in the number of intraligamentous ruptures that he has had. I have never had a rupture into the broad ligament in my experience.

One point emphasized by Dr. Polak, and that has been emphasized by most of the speakers, that the case history is most important in making the diagnosis, I heartily agree with. A carefully elicited history is most decisive in making the diagnosis, and this is especially true in the more doubtful cases.

I was interested in learning that Dr. Polak had differentiated the very considerable group in which there was arrested development, not only constitutional, but also in the sex organs. That interests me, as it is in accord with my teaching for years. My impression is, however, that in no other considerable presentation of cases has there been so large a number assigned to maldevelopment or, as I have designated it, constitutional hypoplasia.

So far as the results are concerned, by his method of management of the tragic cases, I doubt very much whether those who do not agree with him have had any better results, especially when it is recalled that the list includes his early cases. I believe that he is to be congratulated on the fact that reaction did take place in his patients. My own regrets have been for postponing operation and not for resorting to it early. It is my judgment that the greatest safety of the patient who is bleeding from ectopic pregnancy, provided that she is in a hospital, is in immediate operation. "immediately getting in, and immediately getting out." The least done in the way of technical nicety and peritoneal toilet, the greater is the chance for recovery.

DR. COLIN FOULKROD, PHILADELPHIA.—May I ask Dr. Polak whether he lays much stress, in the diagnosis of extrauterine pregnancy, upon the examination of the discharges of the patient for the presence of syncytial cells?

DR. RICHARD C. NORRIS, PHILADELPHIA.—More often, in our routine work, we have found something else, when we have thought that we had to deal with extrauterine pregnancy, than the opposite; that is to say, the diagnosis is generally made, or is suspected, time and time again, in most cases of nontragic character.

As to the question of immediate operation, every one has had these tragic experiences. I have learned that in grave postpartum hemorrhage, injections of salt solution into the bowel are useless; because absorption fails to occur. For the same reason, pouring salt solution into the abdominal cavity of patients exsanguinated from ruptured ectopic cannot be relied upon. If it is to accomplish what we wish, the salt solution must be put into the vein. We have all seen intravenous injection of salt solution temporarily help the patient, so that the operation can be done while preparations are made for subsequent blood transfusion. I can recall two tragic cases which received intravenous salt solution while in the ambulance on the way to the hospital, thus saving, I believe, the patients' lives.

The other phase of ectopic pregnancy, which I am sorry Dr. Polak did not consider, in order to make the picture complete, consists of the advanced cases. I wish he had discussed the technic of dealing with these advanced cases and told us what, in his opinion, should be done with the placenta. He did not refer to that. It is a most important part of this subject. The trend of modern surgery is to do a complete operation, removing the placenta with its attachments, and using every effort to control the bleeding by preliminary ligation of important arterial supply, including even the internal iliac artery. In his closing remarks, I wish Dr. Polak would discuss that question.

DR. W. WAYNE BABCOCK, PHILADELPHIA.—I was very much impressed, as I heard Dr. Polak's description of his method of treating ectopic pregnancy, with the thought that he was following an almost forgotten rule of our surgical forebears. This ancient precept guided surgeons in the treatment of secondary hemorrhage, and was to the effect that "with the first hemorrhage, one may wait; but with the second, one must intervene." That is still a good rule in gynecology as well as in general surgery. Lives continue to be lost from recurrent hemorrhage because this rule has been forgotten or is unappreciated. Personally, I have had the tragic confirmation of experience in postoperative hemorrhages. We know that with initial hemorrhage, a large amount of blood may be lost without causing death; but when the bleeding recurs, the loss of but six to twelve ounces of blood may be sufficient to end the patient's life. Recent experimentation has also proved how the first hemorrhage sensitizes the animal to shock from recurrent bleedings. So Dr. Polak follows a good old rule of general surgery, and it may be that some of the patients who die so suddenly from tubal hemorrhage have bled before and thus have been sensitized to the recurrent hemorrhage.

Personally fearing to delay and impressed with the danger of operating by the abdominal route upon patients in the tragic stage of extrauterine pregnancy, for some years I have used a simple vaginal operation in these cases. The culdesac is punctured by scissors, the opening freely enlarged with the fingers, the gush of blood disregarded, the enlarged tube located by the fingers and swept or pulled down into the vagina, a clamp or ligature applied, a strip of drainage gauze loosely introduced into the pelvis and the patient returned to bed. Even with an interstitial pregnancy, the cornu may be clamped. If the patient's condition warrants the additional delay, I ligate; but if not, I leave the clamp on for 48 hours. The operation may even be done on the edge of the patient's bed. It is quick and without the shock of the abdominal operation, and has not failed to control hemorrhage in about thirty cases in which I have employed it. Of course we do not wash out the peritoneal cavity, but simply let the blood drain out spontaneously after the operation. Our only fatality occurred over two weeks after the operation from pulmonary embolism.

Dr. Polak's results show how successful properly supervised delay in operation may be; but for those of us who fear to wait, this method of vaginal section offers a simple and quick way to immediately and permanently stop the hemorrhage and to eradicate the disease with the least shock to the patient.

DR. POLAK, (closing).—I have subsequently operated on quite a number of women who have had ectopics which were not operated; and we have found, when the abdomen was opened, that these old ectopics had taken care of themselves.

Very recently, in the case of one woman, I made the diagnosis of a tubal pregnancy in the early summer, and asked the patient to come into the hospital for observation. I then lost track of her until she came back this fall with a condition that was not related to the pelvis, diagnosed as appendicitis. We opened the abdomen and found the appendix; and there was the ectopic, a tubal abortion in the isthmic portion of the tube.

I will consider in sequence the points which have been brought up.

First, in regard to the sensitiveness of the cervix: this was noted in the histories of all of our cases. I find, personally, that the sensitiveness of the cervix is far more marked in those chronic ectopics, if we can call them such, where a tubal abortion has occurred or is taking place, where the blood gravitates into the culdesac, and where there is the definite peritoneal reaction. These are the cases in which the most marked sensitiveness is found. In cases with a large accumulation of blood, this sensitiveness is not nearly so marked. That is probably due to

the fact that in these ruptures there is not the slow gravitation of blood and reaction that there is in the tubal abortion, or the slow rupture.

The point I made that seems to have been misunderstood, and is always misunderstood in discussion, is that concerning delay in operating. I do not think that there is really any difference between our attitude towards operation, when we boil it down. We are all agreed that in the nontragic cases we operate at our convenience. In the tragic case we operate on reaction, I am not convinced that I am not right in this, even after the discussion of Dr. Hirst. I believe that a woman who is going to die from the first rupture is going to die before we can do any surgery. I do not believe that these patients die from their first rupture; I believe that they react. That is the first point. The second is that some are brought in in such a bad condition that I do not think that to resort to surgery is a good plan until reaction has occurred. If one morphinizes these cases and waits a few hours, one will find that one of two things happens: As soon as the patient gets under the influence of the morphia, she begins to react; and if she does, she is a better operable risk. On the other hand, if the patient is going down, I would not stand by and let her die while I am holding her pulse. I think that would be the worst kind of surgery. But I have never seen but one of these cases, and that patient died before I could get her to the operating room; and she was not in the hospital more than one hour under observation. Every one of the other cases, so far reacted, that the systolic pressure which was as low as 60, rose to 100. As reaction takes place, we try to get in and get out as fast as we possibly can.

In regard to leaving fluid in the rectum and abdomen, I do not believe that the fluid is taken up from either the rectum or the peritoneum if the patient has a poor cardiac action. At least, I have never seen it taken up if the patient had not a fair heart action.

Dr. Hirst brought out the point that if we give saline, we get a transitory reaction; but this does not hold them. For years, I have watched the cases of one man who promptly uses saline; and I have seen them come out of the operating room with a wonderful pulse, and then die in a few hours, of pulmonary edema. If we need any, we need a very small quantity of saline directly into the vein; and it should be supplemented by gelatin—or, better, by blood. In our hospital, we have orderlies who are donors, who sell blood and get ten dollars for one hundred cubic centimeters of it. Consequently, they are always willing to give some of their blood. If we have a universal donor, we find that he is a very handy person to have around. It takes very little blood to change the picture. It is not the quantity, but the stimulation caused by it when it is thrown in.

In regard to removing the other tube, that point, which was brought out by Dr. Hirst, is very interesting to me; because, you will remember, there were seven cases of repeated ectopics in the series. They were all in this particular class of cases which I have tried to bring out. They had long, tortuous tubes and an infantile uterus—the uterus that is subsequently the fibroid uterus, which the infantile uterus frequently becomes, if the patient lives long enough. So I believe that there is something in that. On the other hand, I should not think of removing the other tube in the class of cases in which the woman has repeated pregnancies. That woman has an ectopic only incidentally. But in the cases of congenital anomaly and those preceded by a chronic pelvic inflammation, I think that Smith is not so far wrong; because I believe that the ectopic pregnancy in them is only an effort on the part of nature to produce a pregnancy in a partially recovered tube.

With regard to decidual curettage, a large number of cases come in with anomalous bleeding; and to make the differential diagnosis between extrauterine and intrauterine pregnancy, curettage with examination of the removed tissue

is necessary. It will show the presence or absence of decidual tissue; and this helps in the diagnosis. It is the only way in which we can find out whether the pregnancy was uterine or extrauterine—by the presence or absence of decidual cells.

We have had three abdominal pregnancies. One of these was reported by my associate, Dr. Beck, before the American Medical Association; and he added 250 cases that he had found in the literature, and drew certain definite conclusions. These three cases were treated differently: one by delivery of the fetus, leaving the placenta *in situ* and packing the sac. This woman took four months to pass the placenta, and was septic all that time. In the case that Dr. Beck reported, we removed the placenta and had a torrential hemorrhage, and only by leaving two clamps on the vessels could we get away with the proposition. In the third case, the placenta was attached to the tube by a pedicle, and this was ligated. If the placenta is low, lying on the uterus or attached to the uterus, I would not remove it; but if pedunculated, it is better to remove it. In Dr. Beck's experimental dog, the animal was able to digest the placenta absolutely; and certainly, if these patients can digest an ectopic, they should be able to digest a placenta when left *in situ*. In the next case, if we find the placenta adherent, we intend to close the abdomen without drainage and let it alone.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

Occipitoposterior Presentations

By RANDALL S. TILLES, M.D., ST. LOUIS, MO.

IN a recent article on occipitoposterior presentation De Lee[1] states: "I feel sure that more children die as a result of improperly managed occiput posterior positions, than are saved by cesarean section performed as it is today on most flimsy indications."

Text books, generally, state that occipitoposterior positions in the majority of cases terminate spontaneously, yet very many of the cases of occipitoposterior presentations, that persist as such, require the assistance of art, and become of considerable importance.

In this type of case we have one explanation for the high infantile mortality during birth, the injuries to the maternal soft parts, with or without infection, and the inevitable permanent invalidism of the mother.

It is the opinion of the writer, after thorough review of recent literature on this important subject, that many calamities may be avoided by the early diagnosis of this condition.

Many of the serious difficulties are preventable, if the position is discovered early enough and proper management instituted.

Edgar[2] in his text book (1907) states that in 2200 labors, occipitoposterior positions occurred in 89 cases, or 4.04 per cent; 51 per cent of these occurred in primiparae, 37 per cent in multiparae, 11 per cent in patients of unknown parity.

Cragin[3] mentions the fact that at Johns Hopkins Hospital out of a total of 1687 cases the anomaly was seen in 16 in 8 per cent at the beginning of labor.

In 500 cases of Pinard the abnormal presentation is recorded in 49.8 per cent, or nearly one-half of the cases.

Dubois found occipitoposterior positions in 26.23 per cent or a little over one-fourth of his series.

In the Sloane Maternity, in 2000 cases observed during the first stage of labor, a posterior rotation was recorded in 11.05 per cent.

Williams estimates the actual percentage at about 22 per cent, while Shears thinks that the right occipitoposterior position alone is present in 30 per cent of cases. Further statistics need not be quoted, as it can be seen that such figures range from 4.04 per cent to 49.8 per cent. This discrepancy undoubtedly is the result of a failure in some clinics to diagnose the condition as early as in others, while estimated high percentages may be somewhat exaggerated.

Peek[6] says that of all vertex presentations 17 per cent are really

occiput posterior, although many cases pass unrecognized because spontaneous rotation ultimately had taken place. At any rate, the lesson learned should be that no one can practice obstetrics long without very frequently encountering this condition. De Lee[5] sums up the situation by saying, "In spite of all that has been said or written, it is the most frequently overlooked abnormal presentation."

The etiologic factors given in recent writings in general vary little from those mentioned in the older text books. It is agreed that, as a rule, when labor starts with a right occipitoposterior or a left occipitoposterior, the anterior rotation occurs and delivery terminates in right occipitoanterior or left occipitoanterior presentation. Sutugin,[7] a Russian author, believes that in the majority of cases the head enters the pelvis in the transverse diameter (agreed to by De Lee), and after the occiput has passed the inlet, it turns either to the front or to the back, most always toward the pubis. When the occiput exceptionally turns toward the sacrum, or the head had entered the pelvis in the oblique diameter with the occiput toward back, then an occipitoposterior position is the result.

Since in the large majority of cases of occipitoposterior position earlier in labor, an anterior rotation finally ensues, a search into the causes of such persistence was made by De Lee,[7] who found them as follows:

(a) Flat pelvis in minor degrees: Occiput meets resistance first, and is forced into deflexion. (b) Primary brachycephalia: Two head levers being of same length, a flexion fails to occur. (c) Pendulous abdomen: Convex back of fetus fits better into the posterior, arched wall of the uterus. (d) Large pelvis, small child: Natural mechanism of labor by balanced resistances becomes inoperative. (e) Prolapse of arm in front of occiput. (f) Anything that mechanically prevents anterior rotation of head, or that holds back the child's trunk and thus keeps the back posterior, such as placenta, tumor of uterus, scars in wall, full rectum or bladder. (g) Exhaustion of powers before rotation is completed. (h) Vices of configuration of the bony pelvic cavity, such as in poorly developed spines of the ischia or a funnel pelvis. (i) Abnormal pelvic floor. It gives a wrong bend to the parturient canal or is not a good gutter.

De Lee adds: "Not all causes are known or understood."

A very short cord, in a case of occipitoposterior position, handled by me, resulted in rupture of the cord at the umbilicus during the final expulsive efforts. I believe the anomaly of the cord in this instance accounted for the posterior rotation, all other conditions having been normal.

Fowler[4] stresses the importance of the spinal ridge as a factor in the consideration of position. The spinal column pressing against the posterior wall of the uterus, in his opinion, causes an elevation of its central portion. The posterior portion of the uterine wall thus is divided into two definite fossae, a condition more pronounced in patients with the male type of pelvis. In left posterior positions the child's left side lies in the right fossa, the left shoulder resting against the spinal ridge. The ridge serves as an obstacle to its passing over to the left fossa, and thus prevents it from becoming a normal left anterior position. The more prominent the spinal ridge, the less likely will a position, once posterior, finally become anterior. Fowler

states: "It is my opinion that other etiologic factors are of minor clinical importance as compared with this."

Warnekros' has greatly advanced our understanding of the mechanism of labor by the use of the x-ray. He was able to procure exact pictures of the fetus within the uterus by means of very short exposures of 8 10 to 9 10 of a second. By preparing a series of pictures of the same patient in the course of pregnancy and during the actual process of labor, he demonstrated that in the absence of a mechanical disproportion between fetus and mother, the head is held "in a comfortable middle flexion." He further states that there is no forced or even typical attitude of the extremities, that their position depends solely on the available space, and that in head and breech presentations any deviation from such a natural attitude suggests an anomaly of some sort. What these anomalies in the individual case are, we hope, some day will be explained by such x-ray pictures.

Becerro de Bengoa[9] explains that occipitoposterior position is caused by a deflexion. This deflexion is due to the diminution of the sine of the angle formed by the uterine axis and the vertebral column, which is reduced when the uterus contracts while the woman is lying in a horizontal position.

In describing the mechanism of flexion and engagement in vertex presentations, Macias[10] mentions that in occipitoposterior presentations the conditions are different from those in anterior presentations. He brings out clearly the point that in these cases the occiput is detained at the level of the sacro-iliac synchondrosis and all the uterine force acts solely upon the anterior extremity of the head. As a result, the face descends. There is always a certain degree of extension which may lead finally to a face presentation. Another condition, very often noticed in occipitoposterior positions, is the nonengagement of the head until the time of parturition. This, he claims, is due to the fact that the presenting diameter is an uncommonly large one, either the occipitofrontal or occipitonasal. The farther the chin descends, the larger are all of the diameters of the presenting part. Consequently the pelvic diameters become insufficient, and the head is detained at the level of the superior strait, in a position of slight extension, and unengaged. Sometimes the head appears to be engaged, but it is not in reality. It simply remains stationary at the superior strait without entering it. He further observes that the slowness of parturition in occipitoposterior cases is due to the absence of flexion. This well explains De Lee's[5] statement, that persistent posterior positions rotate so slowly, and labor drags on so long, that both mother and child are harmed. The child suffers from cerebral compression and disturbances due to a mild chronic asphyxia, and may later succumb to cerebral hemorrhage or atelectasis pulmonum. The mother suffers from the exhaustion, infection, and unavoidable operation. At this point one must realize that in occipitoposterior positions a prompt diagnosis is one of the most essential requirements.

Broadhead[11] in an article on the treatment of occipitoposterior positions asserts that the diagnosis of this anomalous position frequently is not made even by men who are skilled in diagnosis, and that the proper treatment, therefore, is not carried out.

Quoting once more De Lee[5]: "It is the one point most frequently overlooked and is responsible for thousands of infant deaths each year, and for many maternal deaths." For this reason the writer consid-

ers it important to mention here briefly some of the usual findings in occipitoposterior presentation which help to arrive at an early diagnosis.

Abdominal findings, previous to onset of labor: A distinct hollow above pubis; occiput too deep in flank to be felt; forehead often projects over pubis; shoulder not in front as usual but 7 to 12 cm. from midline, or far back in flank; heart tones heard further back to side; small parts on both sides; narrow, irregular, side palpable with absence of the rounded mass, usually formed by back of fetus, on either side of median line anteriorly.

Vaginal or rectal findings: Head high, somewhat deflexed; large fontanel lower, nearer midaxis of pelvis and within better reach of examining finger; small fontanel to right or left behind transverse diameter.

Findings during labor: A long first stage; weak, irregular, ineffective pains; slow effacement and dilatation; premature rupture of membranes; head remaining high above inlet.

A probable diagnosis of posterior position of occiput can be made by a failure of labor to progress during the second stage, and its existence substantiated by abdominal palpation.

Peck[6] says, the most favorable time to diagnosticate the position is immediately after rupture of the bag of waters.

Partridge[12] states that he often found in occipitoposterior labors a "hard head," in advanced ossification with unyielding bones and a very small fontanel; such heads do not mold well.

The author has noticed that in these cases one often is deceived in judging the size of the head. Only a small rounded segment of the skull is palpated to project more or less deeply through the inlet, thus conveying the impression of a very small head. Whenever this occurs, and labor seems slower than normal, suspicion should be strong enough to attempt a verification of the exact position.

Discussing the course of labor in occipitoposterior presentations, De Lee[7] says that two varieties are distinguishable: The one, in which the head remains high, and will not engage; the other, in which the head enters the pelvis but with occiput behind.

The first group is rarer. Labor comes to a standstill, and occasionally a brow presentation develops.

In the second group the occiput descends in either the transverse or one of the oblique diameters, and comes to the second parallel plane of Hodge. From this point on, four terminations are possible: (1) With strong pains, the occiput sweeps forward through 135 degrees, and comes to lie under the pubis (the commonest form); (2) it comes forward more or less, usually to the transverse diameter and then stops ("deep transverse arrest"); (3) the head may descend transversely and may even be delivered in this presentation, the occiput rolling out under one of the descending rami; (4) the occiput may rotate back into the hollow of the sacrum (becoming an occipitosacral position). Under such conditions delivery terminates naturally in two ways: (a) With extreme flexion, the forehead stems behind the pubis and the occiput escapes over or through the torn perineum, with face behind pubis, or, (b) the head descends, deflexion occurs, forehead leads with brow when appearing at vulva.

Fowler[4] says that the slow engagement of the head in the course of an occipitoposterior labor is primarily due to the fact that the occipito-

frontal rather than the suboccipitobregmatic diameter enters the pelvis first, which requires an additional 1/2 inch of room. He also noticed that false pains set in early, probably from 3 to 4 weeks before the estimated time of delivery. This he attributes to an overdistention of uterus and abdominal walls as the result of the delayed engagement of the head. The writer has failed to make similar observations and considers the explanation offered by Fowler inadequate.

Fowler further ascribes a delay in the start of labor to the failure of engagement of the head, with resulting lack of pressure on the sympathetic plexus in the whole pelvic region.

In discussing the course of occipitoposterior labors, Mosher[13] mentions that it is estimated that vertex presentations occur in 96 per cent of all labors, the head entering the pelvis with the occiput posterior in 30 to 35 per cent of the cases.

Broadhead[11] makes the statement that the majority of posterior positions are eventually converted into normal anterior positions, since with normal pelvic conditions and strong pains, the head will flex and a firm pelvic floor will rotate the occiput to the front so that spontaneous delivery will be the final outcome.

Treatment of this abnormal condition varies greatly with different authors. However, all the different technics or manipulations attempt to accomplish the same end result, proper flexion and engagement of the head.

De Lee[5] considers his own method of procedure from two points: (a) when head is engaged and (b) when head is in or above the inlet.

In the second group with the head high and floating, no interference is necessary, but watchful expectancy is the proper course to pursue. He recommends, whenever possible, prevention of an early rupture of the membranes. The patient is kept lying on the side to which the occiput points. This is supposed to favor flexion, engagement and rotation. Morphine and scopolamine are given to prevent exhaustion, and dilatation of cervix assisted by colpeurynter if necessary. He then waits from 1 to 2 hours after full dilatation to see whether the head will engage. If it does not, he ruptures the membranes. If the head still fails to engage, he advocates either version, or manual correction of the malpresentation. Manual correction is accomplished under full anesthesia, with one hand in the uterus. The head is pushed upward, the posterior shoulder sought and swung around to the front, past the promontory of the sacrum. The outside hand forces the head down by pressure on the occiput which now is felt above the pubis. It proves advantageous, in his opinion, at times to draw the head down deep into the pelvis with the forceps, to wait for 4 to 6 labor pains, then to remove the forceps, and either to leave the rest to nature or to act later in conformity to other indications. Subsequent to this procedure even a suprasymphyseal, low cervical cesarean section can be done if aseptic precautions had been followed. He warns against the use of forceps when the head is high, and adds that after the head is engaged the case becomes "gratifyingly simple." Attention may be called here to the advantage of fixing the head, after rotation has been accomplished by external or internal manipulations, by grasping the scalp with a double vulsellum until the forceps are applied.

Lackie[14] is of the opinion, that when necessary, a full anesthesia should be given to complete the dilatation of the os manually. After rupture of the membranes a shoulder is reached, and the whole child

rotated, pushing thus the vertex into a right or left occipitoanterior position. Delivery is then completed by forceps, after a short time had been allowed for molding of the head.

Partridge[12] in discussing manual correction advises an over rotation of the head. In case of a right posterior position, the occiput must be passed beyond the promontory of the sacrum and converted into a left anterior position. In case of a left posterior, it must be changed into a right anterior. He feels that if this is not done, the head is liable to slip back into its original malposition during the application of the forceps.

Lackie[14] offers the following advice: When the abnormal position is not diagnosed until the second stage, after the amniotic fluid has escaped, and when the head is more or less firmly fixed at the brim or in the pelvic cavity, the head should be pushed back and the child rotated in accord with the procedure described before for the floating head. In cases in which the shoulders cannot be rotated, and it is difficult to keep the head in an anterior position, he attempts to fix the head with the right hand, while forceps are applied with the left. If this manipulation fails, Lackie feels that rotation still can be accomplished safely by means of the forceps, applied in the usual manner, but whenever this procedure is used during the attempt of rotation no traction should be made. Bill,[15] on the other hand, advocates the routine use of the forceps for the purpose. He states that by this most satisfactory procedure, he "converted very difficult cases into comparatively easy ones." Of the 249 patients in whom he rotated the head with the forceps, 149 were I para; 77, II para; 17, III para and 6, IV para. In 170 cases the occiput was right posterior; in 79 cases, left posterior.

Summarizing the literature considered in this review, the writer concludes that the problem of the proper management of the occipitoposterior labor hinges entirely on the question of the early correct diagnosis. If labor progresses satisfactorily in spite of the recognized malpresentation, if the condition of both mother and fetus continue normal, noninterference is the treatment of choice. In the majority of instances such watchful expectancy will be rewarded with a spontaneous delivery after the occiput finally has rotated into normal anterior presentation. If labor fails to progress normally, the knowledge of the underlying cause will enable the attendant to institute proper treatment at an early moment. What particular form of treatment, whether postural or manual correction, forceps or version is indicated, will be determined in the individual case by the conditions presenting themselves at the time when interference seems necessary. Failure to diagnose the abnormal rotation is likely to prove harmful both to the mother and to the child.

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Selected Abstracts

Tuberculosis of the Female Genitalia

Cullen: Tuberculous Ulcer of Anterior Vaginal Wall. Surgery, Gynecology and Obstetrics, 1921, xxxiii, 76.

Cullen reports the case of a married woman of thirty-seven who had a primary tuberculous focus in her lung. Her abdomen was opened on account of ascites, showing involvement of the cecum. On the anterior vaginal wall was an ulcer 4 x 6 cm. in size; microscopic examination of a section of this ulcer showed the typical picture of active tuberculosis. Radium and x-ray application having proved unsuccessful, the ulcer was finally excised. Though the wound healed promptly, the ulcer recurred. There was no evidence of urogenital tuberculosis in the husband.   R. E. Wobus.

Greenberg: A Clinical Study of Tuberculous Salpingitis, Based Upon 200 Cases. Bulletin of Johns Hopkins Hospital, 1921, xxxii, 52.

Greenberg presents a clinical study of 200 cases of tuberculous salpingitis which showed definitely upon microscopic examination that tuberculosis was present. A family history of tuberculosis was reported in 22.5 per cent, while in an additional 2.5 per cent the consort had active pulmonary tuberculosis. About one-fourth of the patients had pulmonary tuberculosis. The correct diagnosis before operation was made in only 13 per cent of the cases and in more than half of these the diagnosis was aided by the presence of ascites. Tuberculosis of the pelvic organs was found associated with tubal tuberculosis as follows: Uterus 72.6 per cent; ovaries 33.1 per cent; cervix 3.5 per cent; vagina 0.5 per cent; both tubes in 99 per cent. The peritoneum was involved in 68 per cent and the appendix in 3 per cent of the cases. Myomata uteri were associated with the tuberculosis process in 17 per cent, and in only 2 per cent was the urinary tract involved. The prognosis is grave in the presence of tuberculosis elsewhere in the body, where fever exists, and where the peritoneum is involved. C. O. Maland.

Rudeloff: Diagnosis of Genital Tuberculosis in the Female. Zentralblatt für Gynäkologie, 1921, xlv, 854.

The author's case well illustrates the extreme difficulty of diagnosis in some cases, a point quite recently emphasized by Kundrat (Archiv für Gynäkologie, 1921, cxiv). The patient, thirty-eight years old, on admission gave a history of vaginal discharge, menorrhagia, etc. By means of a spoon a portion of the necrotic cervix is removed. Microscopic findings clearly support the clinical diagnosis of cervical carcinoma. The cervix is then thoroughly excochleated, cauterized, followed by radiation with mesothorium. A short time later a radical Wertheim operation is made. The tissue obtained by the excochleation in certain microscopic fields suggested tuberculosis, but search for bacilli failed. Thorough study of the extirpated uterus finally established definitely the diagnosis of tuberculosis. Cases of a combined carcinoma and tuberculosis of the uterus have been reported (e.g., by Wallart, Zeitschrift für

Geburtshülfe und Gynäkologie, vol. 1) but in this case undoubtedly a tuberculosis at first had been incorrectly diagnosed carcinoma.

H. EHRENFEST.

Lamprianides: Uterine Tuberculosis. Schweizerische Rundschau für Medizin, 1921, xxi, 121.

The tubal form of genital tuberculosis is the most frequent. In 607 cases reviewed by the writer 85.5 per cent showed tubal, 46 per cent uterine, 14 per cent ovarian, and 5.6 per cent vaginal affections. The author believes that the infection is blood borne in the majority of cases and that the lymph stream and genital contact play a much less important rôle. He classifies the pathology of uterine tuberculosis as follows: 1. Miliary; 2. Caseous; 3. Ulcerating; 4. Fibrous or interstitial; 5. Calcareous, and 6. Hypertrophic or vegetating.

The diagnosis is rather difficult. Signs of general tuberculosis, the presence of the bacillus in the discharge, and the absence of other probable types of infection aid materially. Amenorrhea is present in one-fifth of the cases. In treatment one should employ all the general measures commonly used in pulmonary tuberculosis. The author recommends heliotherapy very highly. Cauterization, chemical or with hot iron, is very useful where the disease is limited to the cervix. Curettage of the endometrium may suffice. More radical procedures should be undertaken only when indicated. In general, the treatment must be adapted to the needs of the particular case. L. A. CALKINS.

Lenormant and Moulonguet: Contribution to the Study of Tuberculosis of the Uterine Adnexa. Gynécologie et Obstétrique, 1920, ii, 396.

This study is based on personal observation of 16 cases. In 15 of the 16 cases the tubes were the principal structures involved, with or without ovarian involvement. Tuberculosis of the internal genitalia is rarely primary. Though ascending infection is theoretically admissible, clinically it has never been demonstrated. It is usually an infection carried by the blood stream from a primary focus elsewhere.

A microscopic study of all cases of inflammation of the adnexa will bring the incidence as high as 10 per cent. It is a lesion of young women, though hardly ever appearing before puberty. It is seldom found in women who have been pregnant. Tuberculosis of the adnexa manifests itself in three main forms: (1) Miliary tubercles covering the peritoneum associated with ascites; (2) caseous infiltration with pelvic peritonitis; and (3) a suppurative form filling the tubes without involvement of the neighboring peritoneum, designated by Albertin as cold abscess of the tubes.

In tuberculous peritonitis with ascites in young women, tuberculosis of the genitalia is the most frequent source. By rectal and vaginal examination one should look for well marked, tender masses at the sides of the uterus. Whatever the form, menstrual disorders and sterility occupy a permanent place of diagnostic significance. The infantile type of uterus, small with long pointed cervix, is usually present.

In doubtful cases of inflammation of the adnexa, menstrual disorders, especially amenorrhea, sterility, and infantile uterus throw the balance in favor of the diagnosis of tuberculosis.

The extirpation of all the diseased genitalia is necessary. This involves in most cases a panhysterectomy. The vaginal route offers only inconvenience and dangers. The abdominal route should be followed.

The immediate prognosis is not worse than in hysterectomy in common salpingitis. However, the convalescence is more subject to complication of fistulae and abscess formation. The end results are generally good and cures are lasting. In 80 cases followed by Olivier, 72 are in perfect health, i.e., 90 per cent. Among those cases operated upon by Hartmann, Bergeret and Remilly, 10 have been followed, 3 died of tuberculosis and 7 have remained completely cured.

In the author's cases only tentative conclusions can be drawn as 8 have been operated upon since the war. Of the 8 cases operated upon before 1914, one died immediately following operation, 4 have been lost track of, one seen at the end of 9 months was in excellent health, and the remaining two were apparently completely cured and have remained in perfect health for 7 years.   R. T. LaVake.

Mouchotte: The Diagnosis and Treatment of Adnexal Tuberculosis.
Revue Française de Gynécologie et d'Obstétrique, 1920, xv, 397.

A woman, age twenty-five, complained of severe and recurrent attacks of pain in the right lower quadrant for the past four years. Her family and personal histories were entirely negative as regards tuberculosis, neither were evidences of the disease found on physical examination. Pelvic examination revealed a mass the size of a small apple in the right lateral cul-de-sac. Diagnosis: small cyst of the right ovary.

At operation the author found that the mass on the right side was a tuberculous pyosalpinx. The uterus and left ovary were normal. The left tube was somewhat adherent, larger than normal, dilated in the ampullary region and the fimbriated end was closed. No other evidences of the disease were observed in the abdominal cavity. Owing to the patient's age, negative history, recent marriage, and because proper medical treatment could be employed, the author decided to remove the right tube and ovary only instead of resorting to a more radical bilateral salpingo-oophorectomy with hysterectomy. The patient made an uneventful recovery. The usual hygienic and dietary treatment for tuberculosis was employed together with exposure of the abdomen to air and sunlight. The patient improved rapidly. Three normal menstrual periods have occurred since the operation.

As to the diagnosis of adnexal tuberculosis the author believes that, in the absence of a suggestive history and evidences of the disease elsewhere in the body, the diagnosis can be made only by exclusion, and, in such a case as he reports, even this is impossible.

After a review of the literature the author agrees with the recent trend towards conservatism in the treatment of the disease. With a favorable history, where it is evident that the disease is primary in the adnexæ and not a hematogenous infection from demonstrable foci elsewhere, and where the social condition of the patient is such that adequate medical treatment can be employed, he feels justified in leaving in situ an affected tube and ovary if the process is limited. If the lumen of the tube is patent, pregnancy may occur.

                                        John W. Harris.

Driessen: Genital Tuberculosis in Women. Nederlandsche Tijdschrift voor Geneeskunde, 1920, ii, 1652.

In investigating the final outcome of cases of adnexal tuberculosis, Driessen finds that in the afebrile cases the patients were alive and in splendid health up to ten years after treatment, which was not necessarily surgical. The patients with fever and night sweats, however, usually succumbed earlier.

Driessen places great hope in the development of the use of the roentgen and violet rays for these cases. R. E. Wobus.

Stephan: Special Indications for Roentgen Treatment in Peritoneal and Genital Tuberculosis. Monatsschrift für Geburtshülfe und Gynäkologie, 1921, liv, 314.

Stephan discusses the treatment of tuberculous lesions of the peritoneum and internal genitalia and outlines the general principles of such procedures at present in use in the Clinic at Greifswald.

The clinic does not advocate x-rays in all cases to the exclusion of radical operation and never attempts to employ the latter when an exploratory laparotomy reveals dense adhesions between the loops of intestines and the internal genital organs. Each case must be individualized and treated accordingly.

When there is a typical, dry, adhesive tuberculous peritonitis with the intestines matted together but without ascites, the x-ray is used exclusively; it is immaterial whether or not there is an accompanying infection of the genital organs. Moreover, this treatment is employed in all patients who refuse operation, and in all others who exhibit general cachexia or other primary manifestations which contraindicate operation.

In the miliary form of tuberculous peritonitis with ascites, the abdomen is opened so that the diagnosis may be established by inspection and by the examination of some of the excised tissues. The fluid is drained off at the same time and the condition of the internal genitalia is carefully determined. If the pelvic organs show only a serous reaction to the infection, the entire abdomen is x-rayed during the convalescent period, both through the front and the back, with the small pelvis screened off, so that the pelvic organs are subjected to a dose too small to effect cessation of ovarian function. It is well-known that the hyperemia and round-cell infiltration resulting from the raying of the upper portion of the peritoneal cavity affects the whole serous cavity, even though all corners are not reached primarily by the rays.

In young patients, even when the adnexa are severely involved, it is essential to try to preserve a functionating ovary. This is only possible when the exact conditions are determined at laparotomy. The process is never of equal severity on the two sides and the better of the two ovaries is conserved if possible. If, for example, one side shows the tube alone affected, it is removed completely while the ovary is left in situ, and the other side which shows more extensive involvement is not disturbed, but is intensively rayed after operation, the normal ovary being protected so that menstruation will not be stopped.

In the cases most advanced, with involvement of the whole genital tract and with broken-down foci in the pelvis, the abscesses are opened

and drained through the vagina and during the convalescent period the entire abdomen is intensively rayed. Attempts to preserve the ovaries are neither possible nor practical, because the disease has already produced a widespread destruction of the follicular tissues and has brought ovulation to a standstill.   E. D. PLASS.

Vogt: The Combination of Operation and Roentgen Therapy in the Treatment of Genital Tuberculosis. Deutsche Medizinische Wochenschrift, 1921, xlvii, 293.

Vogt divides the material of the Tübingen clinic in several, not very well defined, groups. The question as to what kind of treatment was to be administered to a certain patient, at times, was determined by available space in the hospital. By comparing these groups, however, he feels justified in coming to rather definite conclusions regarding the choice of treatment in tuberculosis of the female genitalia.

He is emphatic in saying that only the very mildest cases should be treated conservatively. In the moderately advanced cases it may be debatable whether to use the x-ray alone, or only after an operation, but he feels inclined to lean towards the combined treatment. In well-developed cases he found that the removal of the diseased organs followed by radiation gave the best results, even when the process was not limited to these organs. Mere drainage, however, followed by radiation gave surprisingly good results, distinctly better than either treatment by itself.

Since genital tuberculosis is, probably, always secondary, the patient is aided in her recovery by relieving her of as much of the infective process as possible. This can be accomplished by removal or by destruction of diseased tissues with x-ray. Vogt feels that the latter method has the further advantage of conferring additional immunity on the patient.   R. E. WOBUS.

Item

A NEW PACKER FOR THE PUERPERAL UTERUS

By Paul T. Harper, M.D., Albany, N. Y.

TO MAKE possible rapid and aseptic tamponade of the puerperal uterus, there has recently been made for the writer, by the Kny-Scheerer Corporation of New York City, an instrument that differs from the familiar "Rapid" uterine packer in but one, though a most important, particular.

Its diameter of 7/8 inches makes possible the introduction of gauze folded to a width of 1 to 2½ inches. The advantage of the relatively wide gauze in speedy introduction of the tampon is apparent. Further, the caliber of the packer is sufficiently large to permit of the passage of tightly drawn knots where strips cut crosswise of stock gauze are employed.

With the cervix drawn forward and immobilized by means of a large volsellum forceps, the curved uterine end of the packer is readily introduced into the cavity even of a well retracted uterus. Gauze can be introduced rapidly and the instrument manipulated until it "packs its way out" of the uterus, assuring the tampon's
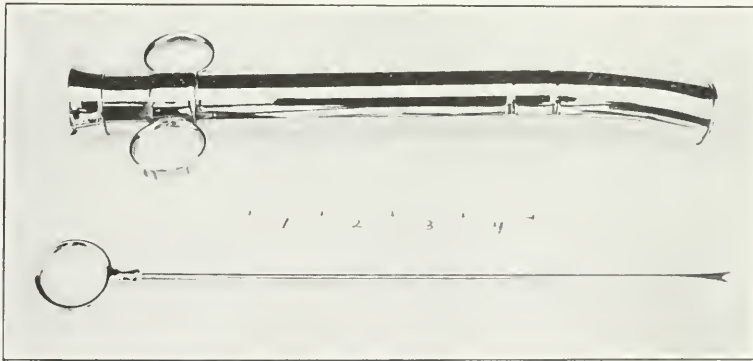
Fig. 1.

being tightly placed. The interior of the uterus is the only "field" with which the gauze comes in contact.

Postpartum intrauterine tamponade is an invaluable procedure in checking the oozing characteristic of low implantation of the placenta, in making impossible the hemorrhage that is inevitable when inertia manifests itself at the termination of labor, and in preventing further blood loss in cases of antepartum and intrapartum hemorrhage. Employment of the packer removes the one disadvantage in carrying out the procedure, namely the danger of infection from contamination of the gauze by the lower vagina, outlet and perineum.

The instrument mentioned makes it possible to tampon the postpartum uterus quickly, efficiently, and safely.

289 State Street.

In Memoriam

Bache McEvers Emmet

BACHE McEVERS EMMET was born at Hyde Park, N. Y., on
May 23, 1843, and died at his home, Ridgefield, Conn., May 27,
1921, four days before his seventy-eighth birthday. His early educa-
tion was obtained in Geneva, Switzerland. Later he studied medicine
and attended the hospitals in Paris, where his father resided for sev-
eral years. He naturally became a proficient French scholar. Return-
ing to America after the close of the Civil War, Dr. Emmet gradu-
ated from the College of Physicians and Surgeons in New York in 1867.
He served as interne in the Woman's Hospital with our esteemed Fel-
low, Dr. George Harrison, in 1870-71, where he was much liked by the
patients on account of his unfailing tact and gentle consideration.
With Dr. Harrison he was later appointed Assistant Surgeon to Dr. T.
A. Emmet, whom he served loyally until the latter's retirement, when
he became Attending Surgeon and remained in that position until
1913, when he was appointed Consulting Surgeon. He was for many
years Professor of Gynecology at the New York Post Graduate Medical
School and Gynecologist to the Hospital, resigning these positions in
1913 when he retired from practice.

Dr. Emmet was elected Fellow of the American Gynecological Soci-
ety in 1887, Vice President in 1894, and Honorary Fellow in 1912. He
was also a Fellow of the British Gynecological Society. His member-
ship in local societies included the New York Academy of Medicine,
New York Obstetrical, New York State Medical and County Societies.

After his retirement he spent his winters in California and the South
and his summers at his home in Ridgefield, where he entered into his
final rest after a painful and lingering illness of nearly three years,
through which he was cheered and sustained by a devoted wife.

Dr. Emmet's life was so quiet and unobtrusive, overshadowed as he
was by the prominence of his famous relative, that he neither desired nor
attained any greater reward than the esteem and respect of his con-
freres, which he enjoyed in full measure. His friends were many; of
enemies he had none. His personality was singularly attractive. Al-
ways modest and unassuming, dignified and high-bred, he had a gentle,
kindly face which won confidence and affection alike from rich and
poor. His attitude towards women, high and low, was that of a gentle-
man. Conservative in his profession and practice, a loyal follower of
his great chief, he was faithful to the traditions of the institution which

he served so long and so well. It was granted to few to know him inti-
mately and the writer counts it a great privilege to have enjoyed his
friendship and appreciated the beauty and purity of his character for
forty years. We use too lightly the good old term "gentleman"—one
who does gentle deeds. It has a deeper significance than the halo con-
ferred by heritage or social position. As we recall the daily life of our
lost friend, his invariable courtesy, his pure and kindly heart, and his
patient endurance until the end, we can pay no higher tribute to him
than to call him the finest type of a Christian gentleman.

"Nothing in his life
Became him like the leaving it."

We laud the heroes of the war. I have looked into the fearless
eyes of many a brave youth, as they closed in the hour of victory, but
no nobler or more gallant spirit have I known than he who, calmly
and unafraid, faced the last enemy, *Erat homo*.

DR. EMMET'S CONTRIBUTIONS TO MEDICAL LITERATURE

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1901.

Instruments Devised by Emmet: Steel Button for Vesico-vaginal Fistula, Peri-
neal Wire Scissors, Trocar for Pelvic Abscess, Broad Ligament Clamps for Vaginal
Hysterectomy, Uterine Forceps for Laparotomy, Various Retractors.

HENRY C. COE. M.D.

Correspondence

EDITOR OF AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY,

Sir:

Under "Correspondence" on page 224 of your August number (1921, ii, No. 2) appears a communication from Dr. Edward A. Schumann recommending a technic for the cure of cystocele. This technic corresponds in all essentials to the operation described by the late Dr. William M. Polk (*Surgery Gynecology and Obstetrics*, 1912, xv, 322).

There is no question that by Polk's operation the upper portion of the pubocervical ligaments (pillars of the bladder) can be sufficiently overlapped and
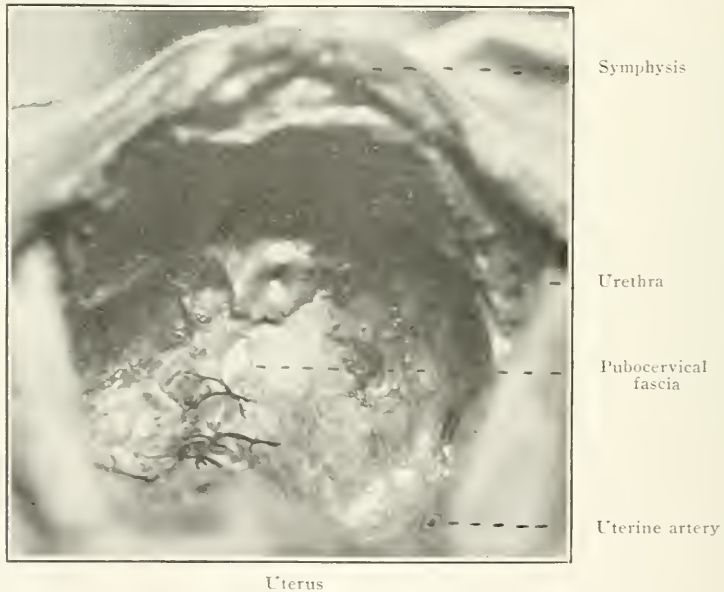
sutured. The lower portion, particularly the lower third, of the gap or weak spot cannot, as a rule, be properly imbricated.

The accompanying figure, photographed from a cadaver dissection in which all but the extreme bladder neck has been removed, shows the fasciae with sutures inserted and tied. (See also Fig. 10, Frank, "A Study of the Anatomy, Pathology, and Treatment of Uterine Prolapse, Rectocele, and Cystocele"; *Surgery, Gynecology and Obstetrics*, January, 1917, pages 42-60.) These sutures have brought the bladder pillars together in the median line.

Not only is the lower portion of the cystocele not fully reparable in many instances by Polk's technic, but the extreme mobilization of the bladder may endanger the nutrition of this viscus. It appears to me that because of these defects and dangers Polk's operation has not been generally adopted.

ROBERT T. FRANK, M.D.

Majestic Building, Denver, Colo.

Original Communications

PNEUMOPERITONEUM AND ROENTGENOLOGY AS AIDS TO MORE ACCURATE OBSTETRIC AND GYNECOLOGIC DIAGNOSIS*

By Reuben Peterson, M.D., Ann Arbor. Mich.

From the Department of Obstetrics and Gynecology, University of Michigan.

IT IS the purpose of this communication to give the results of some ten months' use of roentgenography after the injection of the pelvic and abdominal cavities with gas. Beginning the work with doubt and misgivings as to freedom from danger and practicality from the diagnostic standpoint, it can be emphatically stated that at the present time doubts have been cleared away and that it is one of the most useful procedures ever introduced into the clinic. Like all roentgenographic procedures, it requires long and close study before the plates of the pelvic and abdominal organs can be correctly interpreted. It was an easier matter after some experimenting to secure good plates from a technical standpoint, than it was to interpret what the plates showed.

Hence it follows that the obstetrician and gynecologist in order to obtain the quickest and most accurate returns from his work with pneumoperitoneum, must associate himself with an expert roentgenologist. Moreover, the latter must be interested in this new field and be ready to devote the necessary time to the interpretation of plates the like of which he may never have seen before. In fact it must be team work from the outset. To the gynecologist with his surgical expe-

rience can be safely entrusted the extremely simple technic of gas inflation, either through the uterus or the abdominal wall. He can be instructed even in the methods of making the plates. It is asking too much, however, to expect the clinician at the outset to interpret what is depicted on the plates. His work and experience have not been along these lines, for he has had to employ the x-ray but seldom in his work.

Personally I am very fortunate in having associated with me in this pneumoperitoneal x-ray work my colleague, Doctor James G. Van Zwaluwenburg, without whose cooperation nothing could have been accomplished. Not only has he willingly spent many hours studying out the meaning of the various pelvic shadows, bringing into play his
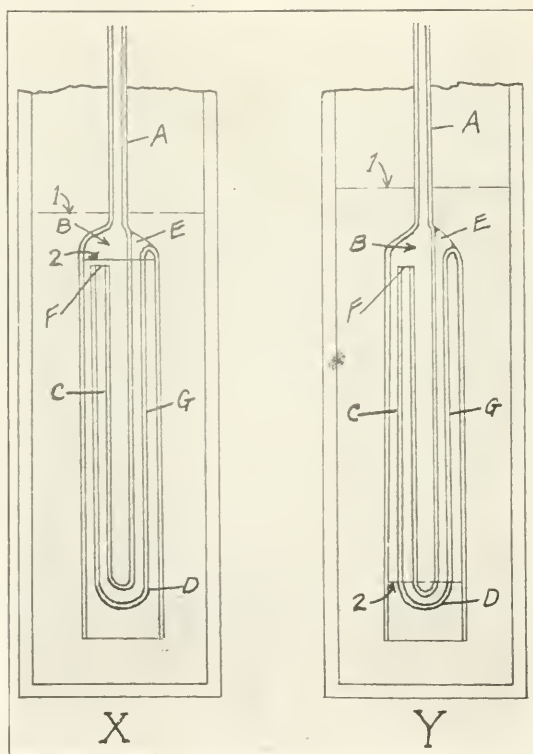
Fig. 1.—Syphon meter.

accurate and comprehensive knowledge of roentgenography, but his patience has been unfailing in guiding me along hitherto unknown paths.

When we began this work Doctor Van Zwaluwenburg and I agreed that elaborate, complicated, clinical technic must be avoided, if a method was to be developed available for the average diagnostician and clinic. Hence the gas inflation, practically from the beginning, has been made in the gynecologic examining room of the University Hospital.

Aside from the emptying of the lower bowel and bladder, the patient needs no special preparation for the gas inflation. In a few of our early cases when oxygen gas was employed, the patient was fortified by a hypodermic of morphine, but this is neither necessary nor expedient when the quickly absorbed carbon dioxide gas is used. Moreover, the use of morphine is inadvisable in the case of ambulatory patients who form quite a proportion of this material at the clinic, since out- as well as in-patients are inflated for diagnosis.

No expensive or elaborate table is necessary for gas inflation, merely one where a moderate tilting of the body downward can be secured. We have found this inclined position to be absolutely essential for the
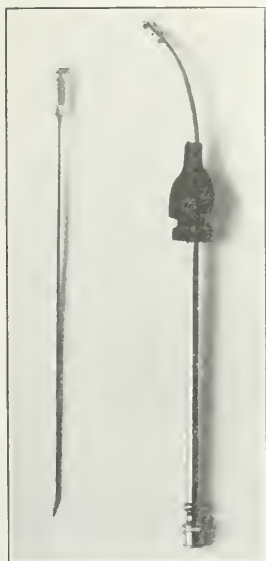
Fig. 2.   Fig. 3.

Fig. 2.—Needle and uterine cannula.
Fig. 3.—Carbon dioxide tank, gas pressure valve, syphon meter and manometer.

best results, since it is necessary for the pelvis to be freed from bowel coils if the pelvic structures are to be shown. This can be easily brought about by the use of the modified Trendelenburg posture with the patient in the prone position. One such table will suffice, although in the clinic it has been found more convenient to make the injection, either through the uterus or abdomen, on the ordinary examining table, transferring the patient to the other table for the x-ray of the pelvis.

At first we used the method of Stein and Stewart, employing a bag between the tank and the point of injection, forcing the gas through the needle by pressure on the bag. This method was aban-

doned in favor of Rubin's apparatus by means of which the gas can be passed under a pressure which is easily gauged, while the amount injected can be accurately measured.

The apparatus for measuring the gas is an inverted syphon pulsating meter used by the engineers for the measurement of chlorine gas. It is composed of an inverted glass syphon inside a cylindrical glass meter (Fig. 1). The operation of the meter is as follows: "When the downward flowing gas in *A*, reaches the point *D*, it will rush up through the tube *G* of the syphon and the bell or compartment *B* will refill with water up to the upper end of *C*. This completes one pulsation or measure of the meter and the amount of gas delivered by this one pulsation is, of course, the capacity of the compartment *B* between the points *F* and *D*." (Wallace and Tiernan Co.) With this apparatus connected with the gas tank it is only necessary to keep track of the number of pulsations to determine the amount of gas which is flowing through the cannula or needle provided there be no leakage. Any resistance to the gas flow can be readily determined by connecting the cylindrical glass-meter with a manometer. (Fig. 3.) For example, the manometer does not register when the gas is passing through the rubber tube connected with the needle with which the inflation is to be made through the abdominal wall. If, however, the tube be compressed at any point, the manometer index will rapidly rise according to the degree of compression of the tube and fall when the pressure on the tube is released. The same thing occurs when the flow of gas is impeded after the passage of the cannula into the uterus or the needle through the abdominal wall.

It is evident that before passing the gas into the abdomen or pelvis, it is necessary to regulate the amount of gas issuing from the tank under great pressure. We have had great difficulty in regulating the flow with the ordinary levers or wheels with which the tanks are provided. It really required more knowledge and experience to move the lever of the tank to secure the requisite gas flow than to use the cannula or needle. This difficulty has been done away with and the whole inflation made simple, easy and accurate by the use of a gas pressure reducing valve by means of which the flow of gas from the tank can be easily regulated. (Fig. 3.)

The uterine cannula is of metal of the Keyes-Ultzmann type perforated at the tip and provided with a rubber obturator for closure of the external os after the passage of the cannula so as to prevent the escape of the gas backward into the vagina. (Fig. 2.) The ordinary spinal puncture needle is well adapted for the perforation of the abdominal wall and the inflation of the abdominal cavity. (Fig. 2.)

The instruments necessary for the gas inflation are scrupulously sterilized before use. The abdominal wall or in case the transuterine

route be employed, the cervix, especially in the region of the external os, is prepared by the free use of iodine. Rubber gloves, sterile towels, etc., are employed just as in any surgical procedure. Unless these precautions be taken, it is easily conceivable that infection may follow gas inflation and not be due to any irritation set up by the gas itself. In order to settle the question whether oxygen or carbon dioxide gas as furnished in the ordinary tanks, contained bacteria, as has been claimed, numerous bacteriologic tests were made of these gases as they emerged from needle or cannula. In every instance the cultures showed no growths. It has been asserted that the low temperature of the gas as it issues under pressure from the tank gives rise to peritoneal irritation. This does not hold true for gas passing through the rubber tubes, because the temperature of this gas as it issues from the needle or cannula was always found to be that of the examining room.

Obviously one must use common sense in the selection of patients to be subjected to gas inflation. Up to the present time no patient with acute inflammatory pelvic disease has been inflated by either route. When the history of recent inflammatory disease is doubtful, even should the patient have a normal temperature, no chances are taken, but the inflation is conducted by the transperitoneal route. While neither shock nor depression have followed the gas inflation, it has been refrained from in certain individuals with impairment of the circulation. In other words the watchword of the clinic in this work has been to take no chances but to always be on the side of safety.

In none of the 300 cases of gas inflation has there been any sign of peritoneal irritation. Thus we think we are justified in the conclusion that with the proper selection of cases and with the proper technic there is no danger attached to gas inflation.

The transuterine is the method of choice since it throws much light upon the patency or nonpatency of the fallopian tubes. The gas can be introduced with as little discomfort to the patient by this as by the transperitoneal route. Where the tubes are found impermeable, the gas is introduced through the abdominal puncture. If the gas be passing freely through the tubes into the pelvic cavity, it is our custom to allow enough to flow so that a satisfactory x-ray of the pelvis can be obtained. In other words, the procedure of Rubin for determining the permeability of the tubes with small quantities of gas, has been carried a step further in case the tubes be patent. This has been done deliberately because of the impossibility with present methods of determining whether the gas be passing through one or both tubal openings. In case one tube be diseased and the other open, the condition of the pathologic tube will be shown by the pelvic x-ray.

The Sims has been found preferable to the lithotomy position where the gas is passed by the transuterine route. (Fig. 4.) The cervix is exposed after the introduction of the speculum and the anterior lip of the cervix seized by the tenaculum forceps after the cervix and adjacent portions of the vagina have been sterilized by iodine. Care is taken to remove all secretions from the cervical canal, a short distance from the external os. The general direction of the uterine canal is located by the sound and the uterine cannula passed, the rubber obturator being pressed within the canal until a snug fit is secured.

Fig. 4.—Method for transuterine gas inflation. Patient in Sims' position, perineum retracted, tenaculum forceps on anterior cervical lip, cannula in uterus.

Dependent upon the condition of the cervix, more or less outward pressure must be exerted upon the tenaculum, else the gas will escape backward into the vagina. It must not be forgotten to test the permeability of the cannula before its introduction. In case of blockage, the manometer index will quickly rise, showing that the instrument is faulty. Failure to observe this simple precaution for both cannula and needle may lead to wrong deductions.

The apparatus should have been previously set by means of the gas pressure valve for about six or eight pulsations a minute. Since the average gasometer of this type measures about 25 cubic centimeters of gas to each pulsation, the apparatus set at this rate of flow will allow of the passage of 125 to 200 cubic centimeters per minute. This amount should be used as a standard, as it has been determined by experience that this is about the maximum quantity which should be passed through normal tubes in one minute.

If the tube or tubes be permeable after the gas has been allowed to flow through the cannula there will be a rather rapid rise of the manometer to about 100 or 110. Then as the gas continues to flow there will be quite a sharp drop from 30 to 50 points, at which place the manometer index remains quite steady. On the other hand, if there be any resistance to the flow of gas through the tubes, there will be a steady rise of the manometer and the flow of gas should be stopped at the 200 point. At first we believed that if the gas did not pass at 150 after two or three trials it could be concluded that the tubes were closed. However, further experience, especially with patients under anesthesia, has shown that patent tubes may require the 200 pressure repeated four or five times before the gas will pass. Whether this means that some obstruction exists in these cases at the isthmic portion of the tube has not been determined.

At first we used too large quantities of gas, some two or three liters, with corresponding pain and discomfort to the patient. Experience has shown that this quantity of gas is unnecessary, if the patient's pelvis be raised and the table tilted so that the gas can rise in the pelvis. (Fig. 5.) This is accomplished after the proper amount of gas has been introduced by holding the patient on the tilting table face downward in the knee-chest position until an inclined board can be placed beneath the thighs. This board makes an angle of about 28 degrees with the plane of the table. Its upper portion is cut out and rounded so that the pubes come to lie just above the deepest portion of the notch. A plate changing tunnel is then placed horizontally on the table and the table tilted forward, the patient prevented from slipping by means of shoulder straps.

Experience has shown that to get the best results the table should be inclined at an angle of about 20 degrees. Excessive inclination of the table, when the pelvic organs are floated forward by the gas, causes too great displacement and makes the pelvic x-ray confusing.

A Coolidge portable unit operating on the ordinary lamp circuit furnishes the x-ray, the direction of the ray being in the long axis of the pelvis and perpendicular to the plate. (Fig. 6.) An 18-inch square of opaque fabric with a $6\frac{1}{2}$ inch circular hole cut out of its center is laid on the patient's buttocks and serves as a diaphragm. Double screened films are used and the exposure varies from 14 to 20 seconds. The tube shift is in the long axis of the body and the stereo set so produced is used as though the patient were lying on the right side.

The best results so far as the x-ray plates are concerned, taking into consideration the comfort of the patient, are obtained by the use of from 800 to 1000 cubic centimeters of gas. Larger quantities of gas quickly injected cause great discomfort and even pain to the patient.

Hence it has been our constant aim to reduce the amount of gas injected to a minimum, our efforts being greatly aided by the use of the table arrangement just described. Since the patients complain of a sense of fullness in the lower abdomen and some discomfort when only 300 to 400 cubic centimeters of gas have been introduced and since that quantity has been found too small for proper inflation, it is obvious that a certain amount of discomfort will always be present. However, the sensation, excluding highly nervous women, may be described as discomfort and not the pain which always accompanies overinflation.

At first we used oxygen gas but abandoned it because it was slowly absorbed with corresponding persistence of the discomfort. Deflation
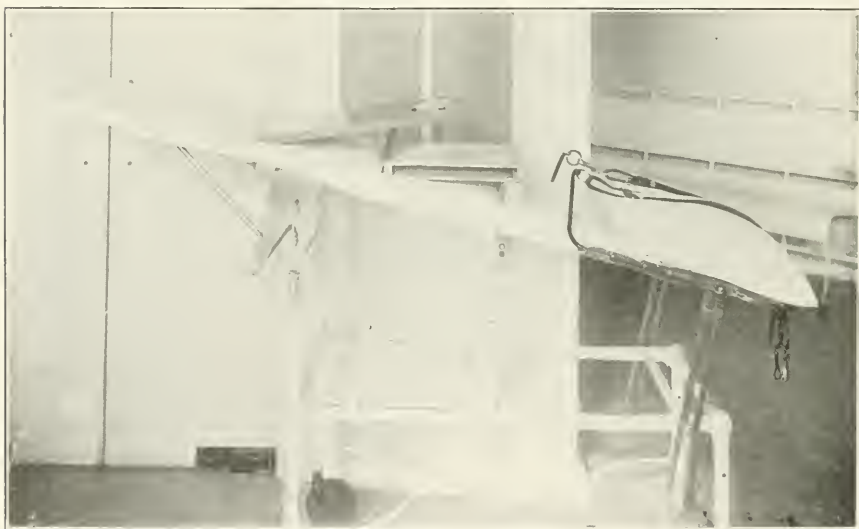
Fig. 5.—Table for taking pelykogram, showing notched inclined plane, tunneled plate holder and table at proper inclination (20°).

relieved to some degree the symptoms but necessitated a second needle puncture, which for obvious reasons did not improve the technic. For these reasons we substituted for the oxygen, carbon dioxide gas which is absorbed so far as symptoms of discomfort are concerned in from twenty minutes to one-half hour. After inflation with this gas patients return to the ward or leave the hospital without discomfort a half hour after the plates have been taken. In fact the one disadvantage of this gas is the necessity of having the technic of plate taking work perfectly smoothly. Delay beyond a certain point means so much carbon dioxide gas absorption as to materially lessen the chances of good roentgenograms.

In addition to acute pelvic disease, profuse purulent and bloody uterine discharges are considered contraindications to the passage of

the gas by the transuterine route. In such cases the gas is passed
through the abdominal wall by the following technic: The skin of
the abdominal wall from the umbilicus nearly to the pubes and for
a width of eight inches is sterilized with iodine. A fold of the abdom-
inal wall just below the navel is compressed laterally with the left
hand and raised upward and made tense. A spinal puncture needle
is passed through this fold in a slightly upward direction at a spot
in the median line one and one-half inches below the umbilicus. (Fig. 7.)
If the skin be made tense and the needle be sharp, no preliminary anes-
thesia of the skin will be necessary. The needle is passed downward
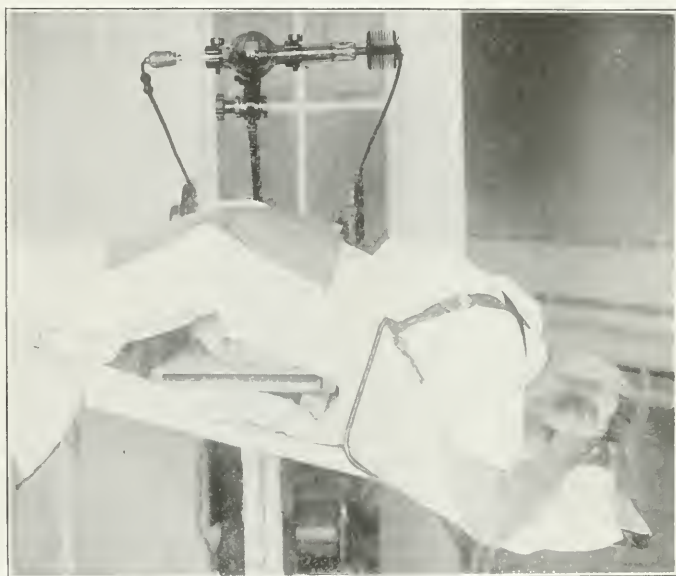
Fig. 6.—Patient after inflation in prone (partial knee-chest) position on inclined table.
Opaque diaphragm, Coolidge portable unit arranged so that ray will fall perpendicular to pelvis
and plate.

until it meets the resistance of the fascia, the left hand still keeping
tense the fold of the abdominal wall. The needle is then thrust
through the fascia and peritoneum, a little experience giving accurate
information to the hand when the peritoneum has been pierced. The
stilet is then withdrawn from the needle and the latter connected with
the rubber tube leading from the syphon meter. The latter is set by
means of the pressure valve to about ten pulsations to the minute, so
that it will require approximately four minutes at the rate of 25 cubic
centimeters of gas at each pulsation for 1000 cubic centimeters of gas
to pass into the peritoneal cavity.

The objection that in case the needle does not pierce the peritoneum,
the gas may be forced through the subcutaneous tissues is not valid,

since by the manometer it can be told at once whether the gas is flowing freely into the cavity or is meeting with an obstruction. When the needle has penetrated the peritoneum the manometer index rises first some 15 or 20 points but falls usually immediately to almost zero. In case this fall does not occur the patient should be directed to take a deep breath which will have the effect of lifting the point of the needle from anything which may be obstructing it.

At first the skin at the point of puncture was anesthetized by Schleich's solution but this has been discontinued since it was found that very nearly as much pain was produced by this procedure as by the passage of the needle. Obviously if the point of election for the puncture is over what may be an adherent intestine or if a neoplasm

Fig. 7. Transperitoneal gas inflation. Needle in abdominal cavity and gas flowing.

lies beneath this site, another portion of the abdominal wall must be chosen.

Before the patient is inflated in addition to a careful history of her case she is subjected to a most complete bimanual pelvic examination to which is added a rectovaginal examination if the case seems to call for it. Without going into details it will suffice to say that an attempt is made in every case to record on the examination sheet what the pelvis contains, not in general but in specific terms. For example, if in the case of inflammatory disease to the left of the uterus the ovary and the tube can be made out, it is so stated. If neither can be recognized by the examining finger it is so recorded. The same holds true regarding adhesions, relation of neoplasms to the uterus, etc. In other words such terms as sensitive mass, boggy mass, left-sided inflammatory have been discarded since our work has been checked up

by the x-ray. We may and do make mistakes but at least they are definite errors from which valuable lessons can be learned.

The plates are taken to the x-ray laboratory and interpreted by Doctor Van Zwaluwenburg without reference to the clinical findings. Then the clinician and roentgenologist go over the plates set up in stereo in an endeavor to reconcile the two findings. If the case be operative, the patient is carefully examined under anesthesia and the

Fig. 8.—Correct inclination of patient, x-ray in axis of pelvis and perpendicular to plate. In this position with movable uterus the anterior and posterior culdesacs will be filled with gas. Plate will show cross sections of isthmus and fundus.
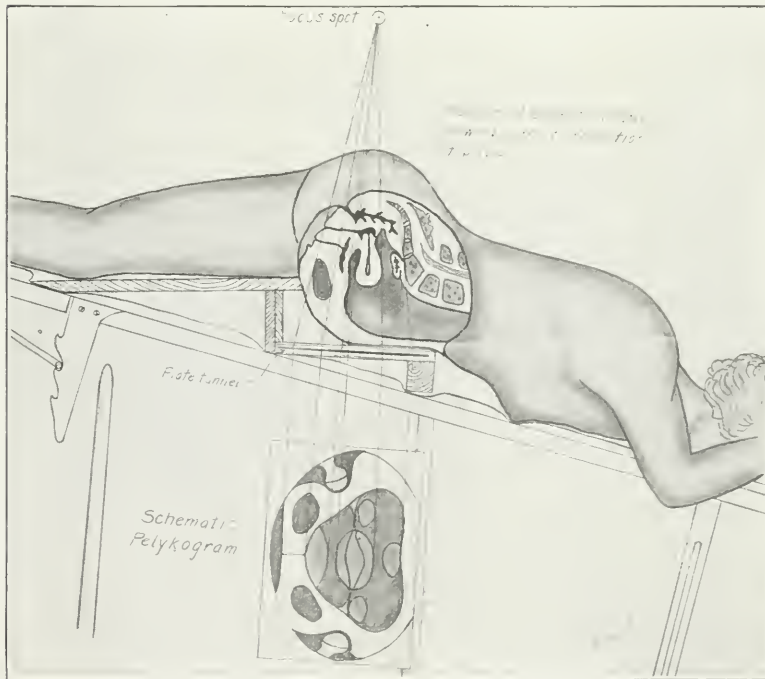
Fig. 9.—Correct inclination of pelvis with schematic pelykogram showing theoretical projection of pelvic organs. Partial knee-chest position secured by prone position of patient on frame and a 20° inclination of the table.

actual findings, uninfluenced by the x-ray study of the plates, are recorded. If the abdomen be opened, the position and condition of the pelvic organs are dictated at the time and the final records of the case together with any removed organs are studied with the plates.

It certainly has been surprising to see how often it has been impossible to determine accurately by the examining finger the exact condition of the pelvic organs. I had failed to realize how much I was depending upon the opening of the abdomen to clear up fine points in diagnosis. From a study of the history together with a thorough pelvic examination it was decided whether the case was an operative one or not. The patients were always examined under anesthesia prior to operation but not so much to determine more accurately the exact pelvic pathology as to confirm the opinion that the case was one for operation. For always the easier method of making the exact diagnosis was ahead of one since everything was to be cleared up after the incision had been made.

All this has been changed since the x-ray of the pelvis has been utilized as an aid to diagnosis. The clinician is placed upon his mettle, so to speak. He carefully weighs his opinion regarding the size and position of the uterus, the tubes and ovaries, if he is to go over his recorded findings and compare them with those of his colleague whose only knowledge of the case is what he sees depicted on the roentgenograms. Renewed interest is aroused in being able to diagnosticate prior to operation what had been considered rather minor pelvic conditions, such as the exact position of the ovaries and tubes, or whether they be free or slightly adherent. At any rate it is a fact that preoperative diagnosis, since the advent of the pelvic x-ray, has received a tremendous impetus in the clinic and has greatly improved.

In definitely stating what can be seen in technically good roentgenograms of the pelvis it must be borne in mind that this new field is constantly changing. What could not be seen at the beginning of our work is perfectly apparent today and the same will probably apply to interpretations of plates months from now. However, enough can be made out at the present time to be of great aid in diagnosis.

The pelvic organs are represented on the plate by optical cross sections at the point of tangency of the projecting rays. (Figs. 8 to 20.) The uterus is nearly always clearly outlined and one can judge of its position, size and contour. If not drawn to one side by adhesions or displaced by a neoplasm, so that the ray as it is shot in the axis of the pelvis catches it fairly, the uterus will show two cross sections, one of the body and one of the isthmus or supracervical portion. It has been found that the isthmus is greatly enlarged and extends more into the broad ligaments in cases of pregnancy than in the nonpregnant. So striking is the change in the isthmus that by this sign alone it has

been possible to diagnosticate pregnancy by the x-ray as early as the sixth week and before softening can be determined definitely by the examining finger. The sign is constant from two and one-half months onward, but we have not had sufficient material to date to be too dog-
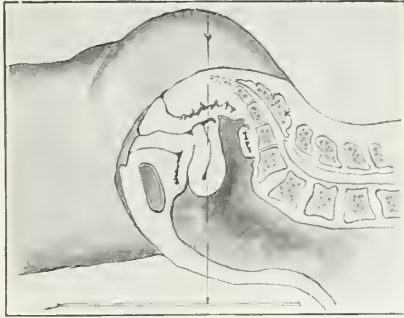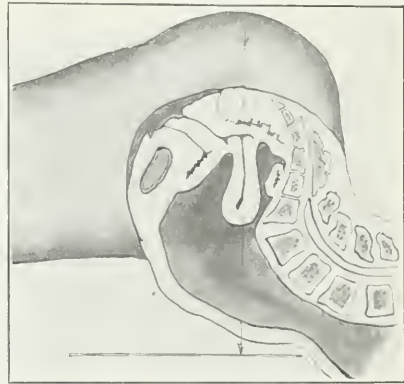
Fig 10.   Fig. 11.

Fig. 10.—Insufficient inclination—no gas in vesicouterine pouch. Failure to differentiate anterior surface of uterus—may or may not project isthmus.

Fig. 11.—Excessive inclination. Restriction of posterior culdesac with failure to differentiate posterior surface of uterus and appendages.

matic about the presence of this enlargement of the isthmus in every case of early pregnancy.

Irregularities of the uterus produced by fibroids and especially calcification changes in these growths are readily recognized on the
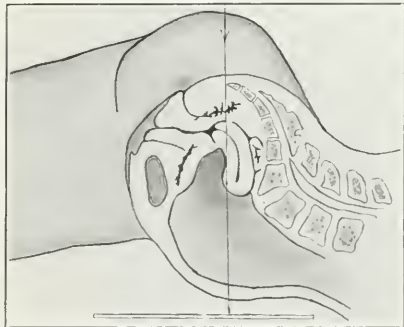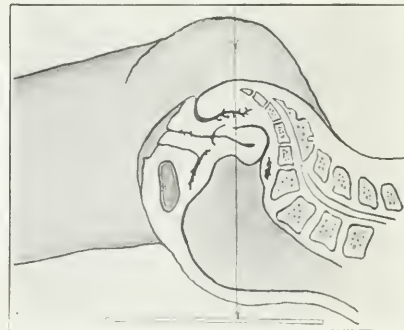
Fig. 12.   Fig. 13.

Fig. 12.—Retrocession. Obliteration of posterior culdesac and excessive width of the anterior culdesac. Simulates excessive inclination of pelvis.

Fig. 13.—Adherent retroversion. Complete failure to differentiate uterus. Often complicated by adherent bowel shadows.

x-ray plate. Through the changes in the isthmus described above it has been found possible to diagnosticate positively the occurrence of pregnancy in a fibroid uterus at a stage when it could not be considered probable from the history and clinical findings. In a num-

ber of cases where the patient has been exposed to pregnancy and where menstruation is irregular it has been possible to state definitely that the patient was not pregnant because of the size of the uterus and the absence of change in the isthmus.

Since experience has determined just the right inclination of the

Fig. 14.—32025—Uterus slightly enlarged in the axis of the pelvis, appendages lost in the thickening on the inferior lateral wall of the pelvis and obviously adherent. An example of the spontaneous replacement of a non-adherent retroverted uterus.
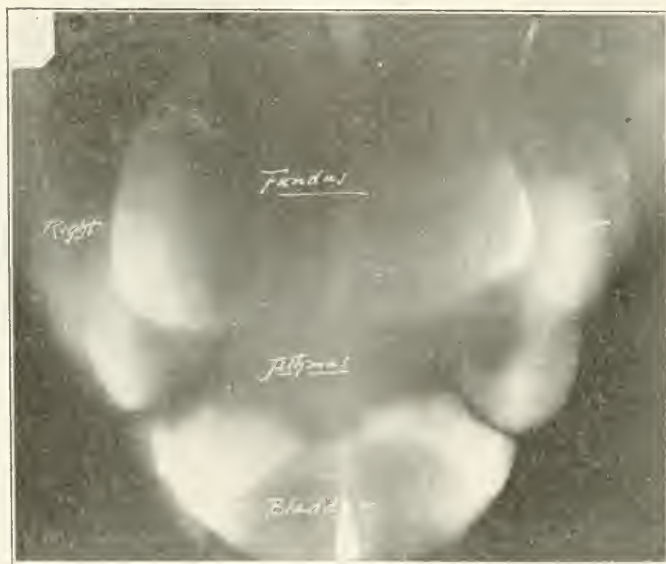
Fig. 15.—30426—Three months' pregnancy. The entire upper portion of the pelvis is filled with a rounded shadow representing the fundus of the uterus. Broad expansion of the isthmus, conspicuous round ligaments placed on the stretch, appendages hidden under the shadow of the fundus.

patient in the prone position on the table to bring about the proper
forward and downward displacement of the appendages, normal ova-
ries and tubes can be shown on the x-ray plates with great regularity.
The size of the ovary can be quite accurately estimated and usually
it is perfectly possible to differentiate between the free and the adherent
organ.

It is not so easy to see normal tubes unless the gas has been passed
by the transuterine route when from their distention they are quite
clearly made out. Enlarged nodular noncystic tubes are well depicted
upon the plates and not infrequently are much better seen than

Fig. 16.—32024—Dermoid cysts complicated with six weeks' pregnancy. The uterus is
slightly enlarged with conspicuous and enlarged isthmus displaced to the left by the large rounded
shadow of the dermoid occupying the right posterior portion of the pelvis. The right ovary is
displaced upwards and to the right. The left ovary is somewhat enlarged, the bladder partly
distended and deformed by pressure.

palpated. Especially is this true when the tubes are adherent to the
sides of the pelvis and covered with plastic exudate. In these cases
the clinician has long realized the difficulties of palpation and has
depended upon the history, thickening in the region of the broad liga-
ments and decreased uterine movability as diagnostic signs of the
condition.

Pus tubes with adhesions to the broad ligaments and bowel coils
are particularly well seen on the x-ray plates. To be sure the clinician
usually has little difficulty in palpating fairly distinct sacular disten-

tion of the tubes but when the pelvis is the seat of an extensive inflammatory process it is often quite impossible to differentiate the distended tubes. From experience the examiner judges what will be found when the abdomen or posterior culdesac is opened but his differentiation of the contents of the pelvis is not nearly as definite as can be brought out by the x-ray.

Pelvic neoplasms if not so tightly wedged in the pelvis as to prevent the gas from surrounding them are clearly shown by the roentgenograms. Since it is perfectly possible to show the outlines of the liver, spleen and kidneys by pneumoperitoneal x-ray plates of these

Fig. 17.   30159—Fibroma of the uterus and bilateral adherent ovaries. The irregularly enlarged uterus occupies the axis of the pelvis, both ovarian shadows are small, lying on the floor of the pelvis and at a lower level than the fundus. On the left there is some evidence of irregular adhesions. The position of the ovaries on the floor of the pelvis in the modified knee-chest position is indicative of their fixation by adhesions.

organs, usually it can be determined by a study of roentgenograms of the pelvis and upper abdomen whether neoplasms arise from the pelvis or elsewhere and this means of diagnosis entails far less pain or discomfort than catheterization of the ureters or other diagnostic measures.

The above will suffice to show the possibilities of the pneumoperitoneal x-ray, since detailed clinical and roentgenographic findings will be dealt with in a subsequent paper. While pointing out what has been and can be accomplished by the new diagnostic procedure, it must not be thought that the idea is to belittle or do away with biman-

ual pelvic examination. In quite a proportion of cases information derived from this source proved far more accurate than that furnished by the x-ray. This was to be expected for bimanual examination has been practiced for years, while this kind of x-ray work is new and confined to only a few hundred observations. In fact nothing is to be

Fig. 18.—32702—Large fibroma occupying the upper portion of the pelvis and showing a nodular shadow representing calcification of a fibromatous nodule. An enlarged tube is seen presenting from behind the mass in the right posterior portion of the pelvis.

Fig. 19.—31760—Salpingitis, minor degree. Insufficient inclination of the patient, producing a narrow anterior culdesac. The right tube can be distinctly recognized as a thickened cord. Otherwise negative.

gained. on the contrary much will be lost, by raising the issue of
antagonism between the two diagnostic methods. Just as it is scarcely
fair to demand that the roentgenologist interpret the pelvic x-ray
plate without any knowledge of the case, so it is asking rather too
much of the clinician in certain cases to state definitely the condition
of the pelvic organs from bimanual examination alone. The rule of
making separate diagnoses has been followed by us deliberately in
order to gain the most knowledge from our different diagnostic meth-

Fig. 20.—33221—Bilateral salpingitis. The fundus of the uterus is approximately in the normal position, flanked on either side by appendages of increased size and density, more marked on the right. The included gas shadows in the right side prove the presence of adherent bowel coils over the appendage.

ods. From now on it is planned to give due consideration to the
other's findings in order that the most accurate diagnosis can be
arrived at by the fullest cooperation.

It must be borne in mind that only about 300 patients have been
subjected to the pneumoperitoneal x-ray. This means that the work,
compared with tens of thousands of gastrointestinal x-rays, is just
beginning. Greater study and experience will lead to such accuracy
of diagnosis that it will be considered as faulty in doubtful cases to
do pelvic work without a pneumoperitoneal x-ray. as to operate upon
the stomach or upper abdomen without a roentgenogram.

Since it cannot be expected of the roentgenologist that he make
clinical examinations, probably perfected diagnostic technic will come
from the clinician who has made himself master of the pneumoperito-
neal pelvic roentgenogram. With his knowledge of pelvic pathology
which comes from his everyday work, he is better equipped than any

one to interpret the pelvic plate provided he is willing to give up the necessary time and study to its interpretation. At least this is not too much to hope in the case of the young obstetrician and gynecologist just starting on his special work. For I am convinced that if we are to demonstrate that there is real need for our specialty, it must be through developing preoperative diagnosis. It should be the aim of the gynecologist by accurate diagnosis to state with ever greater and greater positiveness when an operation is indicated and when the symptoms can be made to disappear by other methods of treatment.

SUMMARY AND CONCLUSIONS

1. The pneumoperitoneal x-ray is a great aid to accurate obstetric and gynecologic diagnosis.

2. In suitable cases and with the proper technic, gas inflation is free from danger.

3. The apparatus for gas inflation and pelvic roentgenography is simple and inexpensive and can be used in any obstetric or gynecologic examining room.

4. The method should not be used in cases of acute pelvic inflammation or when disturbances of circulation may arise from sudden abdominal distention.

5. Since carbon dioxide gas is absorbed within half an hour, it is preferable to oxygen gas for inflation, since the latter gas may not be absorbed for days.

6. Whenever possible the transuterine should be chosen in preference to the transperitoneal route for the introduction of the gas because of the valuable information it furnishes regarding the permeability of the fallopian tubes.

7. Excessive quantities of gas cause great pain. Experience has shown that for the ordinary case 1000 cubic centimeters of gas will cause only moderate discomfort and are sufficient for good roentgenograms.

8. With the proper position (partial knee-chest with tilted table) and the ray directed perpendicularly to the plate in the axis of the pelvis the pelvic organs are clearly shown by roentgenography.

9. Experience with pneumoperitoneal pelvic roentgenography will enable the observer to diagnosticate with great accuracy the pathologic changes in the pelvic organs.

10. There is every indication that pregnancy can be diagnosticated as early as the sixth week by the pneumoperitoneal x-ray.

11. Bimanual pelvic examination and pelvic pneumoperitoneal roentgenography are not antagonistic diagnostic methods. Each is valuable and their value is enhanced if they be used in conjunction, each acting as a check upon the other.

VAGINAL SUPRACERVICAL HYSTERECTOMY WITH INTER-POSITION OF THE CERVICAL STUMP FOR CYSTOCELE AND PROCIDENTIA ASSOCIATED WITH EN-LARGEMENT OF THE UTERUS*

By Hiram N. Vineberg, M.D., F.A.C.S., New York City

IN FEBRUARY, 1915, I presented a short communication to the Obstetric Section of the New York Academy of Medicine upon the operation designated in the title of this paper. I drew attention to the circumstance that not infrequently in procidentia and cystocele, the uterus was found too large to be suitably interposed. The enlargement most often was due to what has been variously termed as chronic metritis, fibrosis, areolar hyperplasia and more recently simple hypertrophy. The enlargement might also be due to fibroid nodules of various size or to a single fibroid growth which increased the volume of the uterus to the size of the gravid organ at the eighth week. With any greater enlargement of the uterus it is questionable whether the vaginal operation would not be found too difficult and tedious, although I have performed it in a few instances where the uterus was the size of the gravid organ at the tenth and twelfth week. Again there are cases when the uterus may not be increased in size and still not be suitable for interposition, e. g., cases of persistent bleeding, the so-called idiopathic metrorrhagia. The surgical procedure hitherto employed to reduce the size of the uterus in the above class of cases has consisted in the excision of a wedge-shaped piece either from the anterior wall or from the fundal area. Most operators, among whom I number myself, found the method unsatisfactory because it was rare to get primary union of the very much thickened and certainly not normal uterine walls. Protracted suppuration was almost the rule and the mortality was rather high.

Another procedure resorted to in these cases is a total hysterectomy with suturing of the round ligaments (Goffe) or the broad ligaments (Mayo). This procedure, however, is usually restricted to elderly women with very much stretched and thinned out tissues.

A third procedure and the one forming the basis of this paper consists in amputating the body of the uterus at or above the level of the internal os and fixing the cervical stump to the subpubic ligament, thus forming a firm and solid support for the bladder. When, as fre-

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quently obtains, the vaginal portion is very much elongated or lacerated and the lips everted and hypertrophied, it is amputated and there will still remain a good-sized stump for the purpose of interposition. The redundant anterior vaginal flaps are excised and sutured to the cervical stump as is done in the usual interposition operation.

As far as I could ascertain from a search of the literature, Löwit (Zentralbl. für Gynäk., 1911, xxxv, 297) was the first to employ the cervical stump after amputating the body of the uterus as a *pelotte* to hold up the bladder in cases of procidentia and cystocele. The technic I have developed differs from that of Löwit in two particulars: (1)
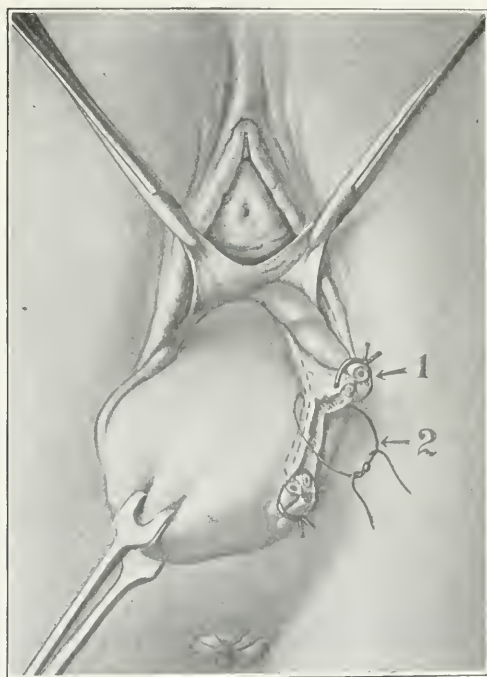
Fig. 1.—Shows uterus everted, left adnexa ligated and removed (1); ligature thrown around the uterine artery but not tied (2).

the application of the subpubic suture (Fig. 3) which I consider a great advantage, (2) in the amputation of the vaginal portion when it is markedly elongated or diseased.

The steps of the operation are as follows: (1) Longitudinal incision of the anterior vaginal wall extending from near the urethral meatus to within an inch or an inch and a half of the cervical os. (2) Separation by sharp or blunt dissection of the vaginal flaps from the underlying bladder. (3) The bladder is pushed up from the uterus and the base of the broad ligaments by gauze or scissor dissection. (4) Transverse incision of the vesico-uterine fold. (5) Delivery of the

body of the uterus through the vaginal incision. Up to this the steps
are identical with those of interposition of the uterus. (6) If the ova-
ries are to be retained a ligature is passed around the ovarian ligament
and the uterine end of the tube on either side and the tissue cut be-
tween the ligature and the uterus (Fig. 2). If the ovaries are to be
removed for one reason or another the ligature is passed around the
infundibulopelvic ligament containing the ovarian vessels. (7) A
ligature is passed at the level of the internal os on either side to em-
brace the uterine artery (Fig. 1). The body of the uterus is then
amputated at the desired level by a curved incision with the concavity
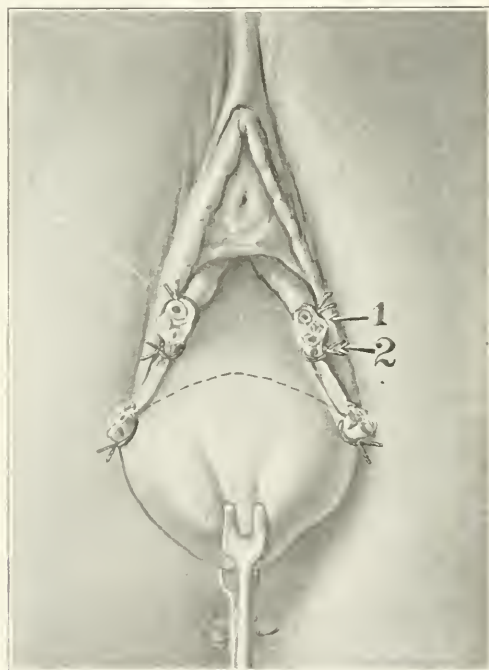
Fig. 2.—Shows everted uterus with both broad ligaments ligatured and cut. Dotted line
indicates level of amputation of the body of the uterus.

towards the cervix (Fig. 2). The edges of the wound on the cervical
stump are carefully coaptated by chromic catgut sutures. When the pa-
tient is under forty years of age and it is desirable to retain the menstrual
function, the incision should be made higher up on the body so that
a portion of the body with the corporeal endometrium is left with the
cervical segment. This was done in a few of the cases and menstrua-
tion, though scanty, was preserved. (8) The cervical stump is now
fixed to the subpubic ligament in the following manner: A chromic
catgut suture is carried laterally for the distance of about an inch
through the subpubic fascia underneath the vaginal mucosa then pene-

trates the cervical stump from behind forwards (in other words the
suture transfixes it) and is carried through the subpubic fascia in the
opposite direction from the other side (suture No. 1 in Fig. 3). Note
that the vesicouterine peritoneum is purposely avoided in this suture.
When the suture is tied, the cervical stump is brought up tightly
against the raw tissues underneath the pubic arch and a firm union
must result. With such a solid plug fixed to the subpubic ligament it
is impossible for the bladder to come down. This assumption has
been confirmed by the subsequent observation of the patients operated
upon. If the vaginal portion is eroded, lacerated, and hypertrophied
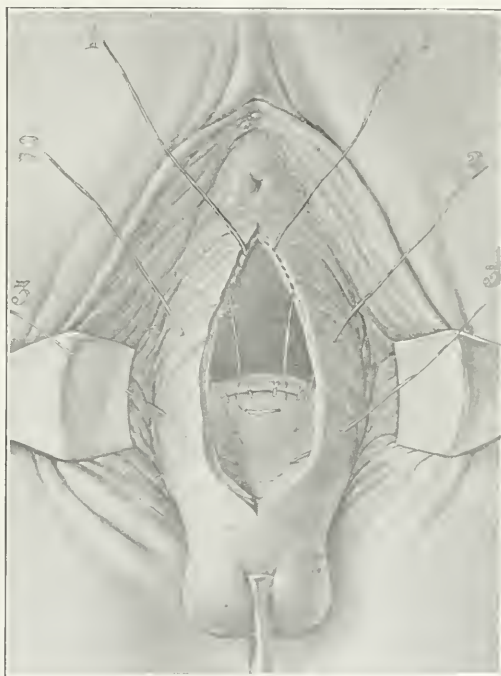
Fig. 3.—Shows manner of introducing sutures: (1) passing through uterus and subpubic
ligament; (2 and 3) vaginal sutures including cervix.

or considerably elongated, it is amputated in a suitable manner and
the resulting wound carefully coaptated by chromic catgut sutures.
Should the vaginal flaps be redundant, a strip of the proper width is
excised from either one. They are then sutured together, the sutures
being carried through the anterior wall of the cervical stump. In some
instances the anterior vaginal wall being longer than the cervical
stump a transverse fold forms on either side. The edges of these folds
can be sutured together by a running catgut suture. The operation
is completed by doing the necessary plastic work upon the posterior
walls and perineum. It has occurred to me that perhaps an additional

support to the bladder might be obtained by suturing together the broad ligaments as in the Mayo operation, but the observation of my results has convinced me that any additional support to the bladder is not needed. Therefore there would be no sense in adding to the length of the operation, which is time consuming as it is, by any unnecessary elaboration.

I began doing the operation in 1912 and until the time of my presentation in February, 1915, I had performed it in 10 cases. From that date until March 1st, 1921, on the second Gynecological Service of Mt. Sinai Hospital, of which I had charge, the operation had been performed in 53 cases; of these 27 were operated upon by myself, the remaining 26 by my associates on the service and the different house surgeons. During this period I have performed the operation in 20 private cases, making a total of 83 cases. It is interesting to note in what proportion of cases of procidentia and cystocele the uterus was found too large for interposition. I deem the uterus as being too large when it is the size of the gravid organ at the fifth or sixth week, or when the walls are very thick and hard. In the period covered by the series of cases reported in this paper I had in private and public practice 226 cases of interposition for procidentia and cystocele, consequently in 309 successive cases of procidentia and cystocele there were 83 cases, or 37.2 per cent, in which the uterus was found too large to be interposed. There was one death in my own personal series of 57 cases, i.e., a mortality rate of 1.8 per cent. There was one death in the 26 cases on the service operated upon by others than myself. The mortality, therefore, for the combined series of 83 cases, was 2.4 per cent. In my own fatal case the patient had been doing well for 12 days, she then developed some fever and on opening the upper angle of the vaginal wound a small amount of pus and tarry blood escaped. A small gauze drain was inserted. The fever then subsided but four days later, during my absence symptoms of intestinal obstruction set in. An exploratory abdominal section was done and purulent peritonitis was found. The patient died the next day. Suppuration in the bed of the interposed cervix occurred in 6 cases. In opening up the upper angle of the wound the process rapidly disappeared with the exception of two cases which took two and three weeks, respectively, to clear up. The final anatomic result was not impaired by the complication.

With increased experience in the technic of the operation the cases of suppuration have been decreasing. It is important to trim the pedicles closely and to effect a good coaptation of the edges of the cervical stump. As nearly all of these cases are associated with marked congestion of the tissues and engorgement of the blood vessels I usually insert a small gauze drain between the vaginal flaps and

the side of the cervical stump. This is removed in 48 hours. Taking into consideration the local conditions in many of the cases at time of operation, the extensive erosions of the cervix, with distended and engorged infected nabothian follicles, with marked edema of the vaginal walls, it is surprising there were comparatively so few cases in which suppuration occurred. Many of the cases should have been subjected to a fairly long course of preparatory local treatment. But in the stress of present-day life, it is difficult to carry this out in private practice, at least in New York City. It is not any easier in public practice as it is not possible with a limited number of ward beds to keep a patient in the hospital two or three weeks prior to operation. In two cases, vesicovaginal fistulæ followed the operation in the hands of my associates. These closed spontaneously after an interval of two or three weeks.

Age of the Patients

30-35	35-40	40-45	45-50	50-55	55-60	60-65
2	16	29	23	8	3	2

The ages varied from thirty to sixty-five years. Sixty cases, or 72.3 per cent, occurred between the ages of forty and sixty-five years.

ULTIMATE RESULTS OF THE OPERATION

In the private series of 30 cases we have to deduct the 6 cases operated upon during the past twelve months as being too recent upon which to report. The remaining 24 cases have been under observation from one to nine years. There was one failure. There was a recurrence of the prolapse of the vaginal walls and the cervical stump prolapsed to the introitus. The parts, however, have been easily kept up by a small ring pessary which was not possible to do prior to the operation. This was among the first five cases operated. One patient continued to complain of a great variety of pelvic symptoms although the anatomic result was good. In the remaining 22 cases the anatomic results are good in all and in a great number of them they are simply ideal. The stump of the cervix is high up in the vault of the vagina, it is movable and there is no protrusion of the bladder, even when the patient bears down. All of the patients are free from all pelvic symptoms.

The data of the ultimate results of the hospital ward series of 53 cases are very meager, inasmuch as the follow-up clinic in the hospital has as yet not been fully developed. The patients were requested to return periodically for observation, but only 13 of them followed the request. In one of these cases there was a recurrence of the cystocele and in a second case there was slight protrusion of the anterior vaginal wall. In a third case the vaginal portion which had been very

much elongated but which had not been amputated, protruded out-
side the introitus a few months after the operation. I amputated the
vaginal portion afterwards and the result since then has been most
satisfactory. In the remaining ten cases the results were perfect.

My experience with our follow-up system as it is constituted, has
taught me that in most conditions it serves no guide as to actual re-
sults, for as a rule only those patients return who have something to
complain of, no matter how remote a bearing it may have to the opera-
tion. Hence it may be fair to assume that of the 40 patients who did
not return the results were good in the majority of them.

CONCLUSIONS

(1) In over one-third of the cases of procidentia and cystocele the
uterus is found too large to be adapted for interposition.

(2) Decreasing the size of the uterus by excising a portion of the
anterior wall or fundus has been found unsatisfactory on account of
the rarity of obtaining primary union of the thickened and diseased
walls of the uterus and the consequent high morbidity and mortality.

(3) A much more advantageous procedure consists in amputating
the body of the uterus at the level of the internal os or higher up (if
the patient be under forty years of age) and interposing the cervical
stump.

751 MADISON AVENUE.

THE INTERPRETATION OF VESICAL SYMPTOMS IN GYNECOLOGIC DIAGNOSIS*

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From the Department of Gynecology, University of Pennsylvania.

SYMPTOMS of deranged bladder function play an important rôle in the histories of many gynecologic cases and the proper interpretation of these symptoms presents problems of intense interest from the standpoint of diagnosis, and not infrequently it furnishes data upon which depend the indications for appropriate remedial measures. For a number of years I have been especially interested in the investigation of such symptoms and have made routine cystoscopic examinations in all patients presenting vesical symptoms irrespective of the nature or extent of the pelvic pathology. In the majority of cases the alterations in the bladder have been of a purely secondary nature, but their visual demonstration has proved an attractive study; on the other hand, we have been able to discover associated lesions which were entirely independent of the pelvic pathology, lesions often of more vital import than those within the pelvis whose presence might have remained unsuspected had symptoms alone formed the basis of diagnosis. Again, cases have been referred for the correction of some minor gynecologic anomaly supposed to be responsible for the vesical symptoms which, in reality, played no part whatever in their production, the actual lesion being in the bladder itself or upper urinary tract.

This paper will include a brief résumé of our findings, taking up first the alterations in the bladder, ureters or kidneys which are direct sequelae of the pelvic pathology, and secondly, certain types of associated lesions which we have encountered in our investigations. The object of this presentation is to emphasize the importance of detailed cystoscopic studies in all patients with vesical symptoms rather than the dependence upon the clinical history or laboratory examinations for their interpretation.

Because of its intimate anatomic relationship with adjacent structures, the bladder often participates in the pathology of these organs, whether this be in the form of a displacement, neoplasm or infection. The vesical symptoms arising from such participation naturally vary in degree as well as kind, and depend primarily upon the nature of the pelvic lesion and secondarily upon the subsequent changes either

within the bladder alone or in combination with the kidneys and ureters which may in their turn become involved.

Distortion of the bladder incident to the direct pressure or traction of benign tumors deserves but passing mention. Here the symptoms are primarily of a purely mechanical origin and are characterized by frequency of urination, especially just prior to and during menstruation, or more rarely by partial or complete obstruction to the passage of urine. Painful urination is usually the manifestation of an infection which may, with ease, be engrafted upon a chronic retention. Hematuria is rarely found in association with uncomplicated benign tumors and, when present, may be due to small varices in the bladder wall or to minute papillary excrescences of the mucosa in the immediate vicinity of the tumor, both incident to impaired circulation. Consequently, hematuria in association with a benign pelvic tumor should never be considered a secondary manifestation until proved so cystoscopically, for it usually signifies a lesion in the bladder or kidney entirely independent of the pelvic lesion. Likewise pyuria, in the absence of an antecedent history of retention or evidences of an infected tumor, is an uncommon secondary event and its presence should be the indication for cystoscopic study to determine the exact nature and location of the infection.

Malignant tumors, especially carcinoma of the cervix, frequently produce vesical symptoms due to direct extension of the growth to the bladder or secondary to renal infection incident to incomplete occlusion of the ureters. Passing over the extensive bladder changes and symptoms common to advanced cases of cervical cancer, it is worthy of note to emphasize the value of cystoscopic study in the presumably early cases, for by this means one may find data of value in determining operability. This applies particularly to the cervico-fundal type of growth which to external appearances offers a favorable operative result; on cystoscopic examination, however, one may find changes in the bladder wall indicating an extension of the growth beyond the confines of the uterus, in which operation would be a futile procedure.

The majority of cases of acute pelvic infection, with associated vesical symptoms, present little or no difficulty of interpretation, due to extension by continuity along the urethra or to direct contact between the bladder base and the diseased structures; here, cystoscopic studies are not only unnecessary but often inadvisable. In the chronic cases, however, the presence of persistent bladder irritability is certainly an indication for such investigation to determine the nature and extent of the disease, whether it has arisen as a purely secondary manifestation or is a coincident lesion, independent of the primary pelvic

infection and to what degree, if any, the ureters and kidneys are sharing in the production of symptoms.

Passing over without comment the ordinary evidences of chronic urethral and bladder infection, we shall consider briefly a few observations relative to an associated ureteral and renal involvement.

In their course along the lateral pelvic walls, but especially through the broad ligaments, the ureters are brought into such intimate contact with infections of the uterus and its adnexa that their participation in the disease would seem a most likely as well as a common occurrence, arising either from direct extension of the process in cases of acute infection or from compression incident to contraction of a pelvic exudate in the chronic cases. Our experience has been, however, that while such potentialities are present, their actual occurrence is not common, for in only a few instances have we been able to demonstrate a stricture of the ureter or a pyelitis which we could look upon as the result of an associated pelvic infection.

The diagnosis of a secondary pyelitis is not warranted unless definitely established by careful cystoscopic studies, for occasionally an acute pelvic infection may present the symptoms of renal involvement, and yet such does not exist. In five of these cases we have found the ureters and kidneys normal both anatomically and functionally, with sterile cultures of the urine. One case with a large pelvic abscess subsequently developed a perinephritic abscess; in the others, the renal symptoms rapidly disappeared with the subsidence of the pelvic infection. Here we were unquestionably dealing with a perinephritis and not a true renal infection arising from the primary focus in the pelvis.

Hunner has called attention to the frequency of ureteral strictures which may give rise to vesical and renal symptoms and which occur secondary to infections within the pelvis or in more distant structures. While we are not in full accord with his views on the subject, we are of the opinion that he has opened up an interesting field of investigation, and that in obscure cases of protracted vesical irritability and pain, this lesion must always be considered and appropriate measures used to satisfactorily eliminate its presence.

Our studies have been made in the types of infection commonly seen in a gynecologic service and do not include in any great number the acute puerperal infections which, from the nature of their pathology, offer ideal conditions for the development of renal complications and in which such complications are often encountered.

In cases of extensive prolapsus and cystocele, the symptomatic manifestations of impaired bladder function are primarily mechanical in their origin, but later may be modified by the addition of an infection, the invasion of which is made easy by the distorted anatomy of the urethra and bladder. The interpretation of the symptoms which these

patients give, such as incontinence, frequency, retention, etc., is read-
ily demonstrated by cystoscopic examination, and the findings are
more or less uniform, differing only in degree. The urethra shares
with the bladder base in its loss of support and because of the sagging
of its posterior segment, the canal assumes a direction more vertical
than horizontal; there is also dilatation of the posterior urethra with
an attenuated, edematous sphincter, irregular in outline and showing
pseudopolypi projecting from its edge. There is not only a saccula-
tion of the bladder base but an actual descensus of the trigone along the
anterior cervical wall carrying the ureteral orifices to a lower level than
normal. The mucosa of the trigone is edematous and its blood vessels
are deeply engorged. Thickening of the muscularis is evidenced by
widespread trabecular hypertrophy. Some degree of retention is com-
mon in large cystoceles and this stagnation invites infection which
modifies the picture by the changes characteristic of cystitis.

The study of these cases is not complete until one has determined to
what extent, if any, the ureters and kidneys have become affected by
the distortion of the bladder. The descensus of the trigone necessarily
carries with it the terminal portions of the ureters and this traction
and torsion may lead to partial obstruction of the ureteral lumen, re-
sulting in a hydroureter or hydronephrosis. It is a common experience
to find catheterization of one or both ureters difficult or even impossi-
ble in cases of large cystocele and prolapsus uteri since the catheter
tip meets an obstruction one or two centimeters from the meatus, but
on reducing the cystocele by inserting a tampon in the vagina, the
angulation of the ureter is removed and catheterization proceeds with-
out difficulty. The demonstration of such an obstruction by no means
indicates a functional impairment of the ureter, for in several of these
cases we have shown by pyelograms the angulation of the ureter with
a normal lumen above it. On the other hand, a potential obstruction
is present, which, with increase in the mechanical factors or in the
presence of infection, may be converted into an actual obstruction,
giving rise to the typical symptoms of hydronephrosis or pyelitis as
the case may be. Such symtoms often show a definite relationship to
menstruation and are due to the increased edema of the trigone which
serves as an additional factor in occluding the intravesical portion of
the ureter.

In concluding this portion of our paper, we would refer to the asso-
ciation of vesical symptoms with an uncomplicated anteflexion or
retroflexion of the uterus. Contrary to the generally accepted teach-
ing, we are of the opinion that the malposition *per se* is rarely, if ever,
productive of vesical irritability, for our experience has shown that
the origin of such symptoms is to be explained by a lesion along the

urinary tract, and is in no way dependent upon pressure which the uterus may make upon the bladder base.

With this résumé of vesical lesions which may arise as the direct result of pelvic pathology, let us pass to another and by no means less important phase of the subject, viz., the recognition of complicating lesions within the urinary system, the pathology of which is entirely independent of that within the pelvis. The symptoms of both may be limited to those of deranged bladder function and here again their interpretation must depend entirely upon cystoscopic studies. In many instances incomplete and, indeed, often unnecessary, operations had been performed upon these patients due to hasty conclusions based merely upon the clinical history and pelvic examination.

In conclusion, we cannot emphasize too strongly the importance of making cystoscopic examinations in all gynecologic cases presenting vesical symptoms, even though the condition may seem quite sufficient to explain these symptoms. Not infrequently, by such a plan, lesions will be discovered which were unsuspected and which are of more vital import than those of the pelvic organs.

MEDICAL ARTS BUILDING.

CERTAIN DIETARY FACTORS IN THE CAUSATION OF STERILITY IN RATS*

By EDWARD REYNOLDS, M.D., AND DONALD MACOMBER, M.D.,
BOSTON, MASS.

ANIMAL breeders have long held that glossy coat, clear eye, firm muscles, etc., were essential to successful reproduction and have attempted to obtain this state, which they call "good breeding condition," by grooming, graduated exercise, and special diets which, in all species, they habitually make high in proteins.

Our clinical experience with sterile human couples early led us to notice the frequency of poor general condition in one or the other of the partners and brought us to the question of how far many sterilities may be due to the evident absence of "good breeding condition" in these individuals. Reading along this line led us to the study of the dietary work of McCollum,[1] Osborne and Mendel[2] and others. We noted their observations that diets deficient in certain important elements have resulted in lowered fertility. These elements are the mineral salts which are characteristic of the ash of all animals, of which

calcium is the most important, a sufficient amount and variety of the proteins, and the substances which are generally known by the somewhat unfortunate name of vitamines and are classified as the fat soluble A vitamine, the water soluble B vitamine, and the antiscorbutic vitamine.

Personal interviews with McCollum and Mendel, their suggestions, and still kinder offers of assistance, then led us to the experimental work on which this paper is founded.

We were fortunate in obtaining an opportunity to work in the genetic laboratory of Castle at the Bussey Institution of Harvard University and gladly acknowledge our great indebtedness to his advice and instruction.

The deficiency diets were planned for us by McCollum to produce sterility without marked loss of health in adults or extreme underdevelopment in growing individuals and the general condition of the animals so dieted has been watched carefully by weight charts (Figs. 6 and 7).

The fertility or infertility of the animals so treated has been established by matings and rematings under varying conditions and from time to time the testicles and ovaries from individuals on each diet have been subjected to serial section and histologic study. Here we must express our gratitude and indebtedness to Bremer of the Harvard Medical School in whose laboratory and under whose direction the histologic work has been carried out. The work is still in progress, but has already yielded some results which will be touched on later (Figs. 8 to 14).

The composition of the diets used is shown in Table I and their analyses in Tables II and III, but lack of space forbids a full discussion of their details in the text. All the diets were fed in unlimited amount, an ample supply being continually before the animals. The stock diet of the laboratory on which Castle's rats have shown an exceptionally high fertility, and which we used as a check diet, differs from the others in that it offers a certain element of choice in accordance with individual appetites, being always present in two forms, a powdered dry mash and a bread, or cake, similar to dog bread. The rats consume on the average equal quantities of each and the analysis of the stock diet as a whole in Table II, is based on this fact. The deficiency diets were fed in powdered form only (dry mash) and were therefore invariable. In selecting a low percentage of the fat soluble A vitamine, of calcium and of proteins for the three diets to be experimented with we were guided by the fact that these are the three vital substances in which deficiencies are most frequently observed in human beings in this country. The deficiencies in the water soluble vitamine and the antiscorbutic vitamine are rare in western civilized life and are more-

TABLE I

COMPOSITION OF DEFICIENCY DIETS

DIET LOW IN FAT SOLUBLE VITAMINE		DIET LOW IN CALCIUM	
Rolled oats	40.0	Whole wheat	67.5
Gelatine	10.0	Casein	15.0
Casein	5.0	Whole milk powder	10.0
Salt Mixture (McCollum)	3.7	Sodium chloride	1.0
Dextrine	40.3	Inert substance	1.5
Cod liver oil	1.0	Cod liver oil	5.0

DIET LOW IN PROTEINS		DOUBLE DEFICIENCY (WAR) DIET	
Wheat	70.0	Wheat	60.0
Salt mixture (McCollum)	3.7	Sodium chloride	1.0
Dextrine	21.3	Inert substance	1.5
Cod liver oil	5.0	Dextrine	32.5
		Cod liver oil	5.0

It will be seen that each diet in this table contains an ample supply of all essential elements with the exception of the one for which it is designed to be deficient.

TABLE II

CHEMICAL ANALYSIS OF DIETS

	STOCK DIET	LOW FAT SOL. VITAMINE	LOW CALCIUM	LOW PROTEIN	DOUBLE DEFICIENCY OR WAR DIET
Protein	18.0	19.6	23.4	8.4	7.1
Fat	10.1	3.8	6.7	6.5	6.3
Carbohydrate	55.3	63.1	53.6	69.5	72.3
Salts	4.7	4.5	2.6	5.0	2.1
Fiber	0.9	0.9	2.7	1.3	2.6
Moisture	11.0	8.1	11.0	9.3	9.6

By comparing the various diets as to chemical constituents it will be noted that they are all adequate except for the designated deficiencies.

TABLE III

VITAL ANALYSIS OF DIETS

	STOCK DIET (AMPLE IN ALL ELEMENTS)	LOW FAT SOL. VITAMINE	LOW CALCIUM	LOW PROTEIN	DOUBLE DEFICIENCY (LOW IN CALC. AND PROTEIN)
Protein	18.0	19.6	23.4	8.4	7.1
Fat. Sol. Vit.	5.0*	1.0*	5.0*	5.0*	5.0*
Calcium	1.8	1.88	0.03	1.88	0.03

The amount of the fat soluble vitamine cannot be determined by chemical analysis. The figures given represent the amount of the vitamine containing substance.

*Estimated.

over disease-producing. They were therefore omitted. To the three diets selected we added a fourth, a diet deficient in both calcium and protein, on the ground that it is at least a partial representation of the war and postwar diets from which portions of Europe have been, and are even now, suffering. This double deficiency is therefore of human interest at this moment.

The rat was selected as the experimental animal mainly for convenience, as an omnivorous animal with a digestion closely comparable with that of our own species, and as being singularly free

from any of the diseases or abnormalities which produce sterility. This makes it especially useful for a study of the production of the functional decreases of fertility which was the object of this work. We used a strain of Albino rats which had been inbred by brother and sister matings with selection for health and strength for thirty-four generations by Helen D. King[3] of the Wistar Institute. This strain is especially valuable for experimental work on account of its extreme genetic uniformity. King reports that 80 per cent of their matings have been fertile in her laboratory where the diet is very varied. On the stock diet of Castle's laboratory without selection it has been 65 per cent.*

These rats were subjected to the deficiency diets without any other change in their life conditions. Rats on each of the diets were then bred together and the results were checked by breeding the same individuals with rats of known previous fertility from Castle's stock. As more than 96 per cent of Castle's rats are fertile, individuals of previously proved fertility from this strain have been here considered as possessing 100 per cent fertility.

TABLE IV

RESULTS OF MATINGS ON VARIOUS DIETS   (KING X KING RATS)

DIETS		NO. OF MATINGS	NO. OF POSITIVE MATINGS	PERCENTAGE OF MATING FERTILITY	PERCENTAGE OF INDIV. FERTILITY
Stock diet		23	15	.65	.81
Low Fat Sol.	Proved	8	4	.50	.70
Vitamine diet	Unproved	13	4	.31	.55
Low Calcium diet	Proved	0	0		
Low Protein diet	Unproved	7	1	.14	.37
	Proved	0	0		
Double Defi- ciency diet	Unproved	5	0		
	Proved	3	0		
(Low in calcium and protein)	Unproved	5	0		

This table shows the result of matings in which both partners were King rats and both were on the indicated diet.

We think that our experiments have already shown that dietary deficiencies which are too slight to produce ill health or even marked loss of condition nevertheless result in a high percentage of infertile matings; they also show that many of the individuals which compose these infertile matings are capable of reproduction when remated to highly fertile individuals; they suggest that the degrees of infertility

*It should be noted that King in maintaining her strain has bred from her best rats, while we, necessarily, bred all our rats without distinction.

so produced can be measured with fair accuracy; and that a threshold of fertility below which reproduction does not occur can be approximated. Complete proof on these two latter points will, however, require larger numbers than we have so far employed.

The effect of these diets on the fertility of the individuals concerned is given in percentages in the column headed Mating Fertilities in Table IV. We intended to test all the deficiency diets both on rats which had been previously fertile when on stock diet, and on rats reared to maturity on the experimental diets, but accidental deaths and other laboratory accidents in connection with the small supply of stock available at the start made the number of previously fertile rats
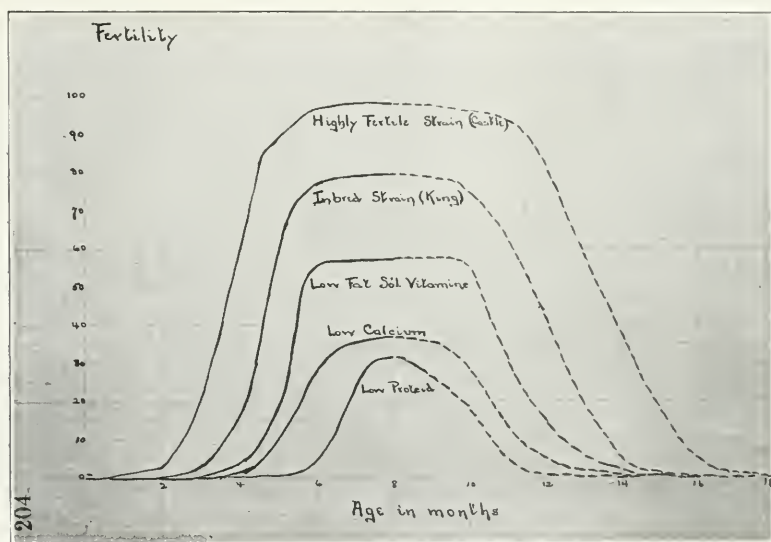
Fig. 1.—This chart combines percentage of fertility with the age at which reproduction first occurred for Castle rats; for King rats; and for rats on the three single deficiency diets. The dotted half of each curve does not represent actual observations, but conforms roughly with the sexual life of these animals. The sharp rise corresponds to puberty and the sharp fall to the cessation of sexual activity. Note that the effect of deficient diet is to shorten and depress each curve as a whole.

which were mated on the two diets which were deficient, respectively, in calcium and in protein, too small to warrant a report. These results are also shown graphically in Fig. 1 in which the curves show both the age at which fertility occurred and the degree of fertility which was finally attained on each diet.

When the diet deficient in the fat soluble vitamine was given to rats which had been fertile while on the stock diet, it produced a decreased fertility which is probably too slight to be used statistically from so small a number of matings. It is included in the table for what it is worth, but will not be discussed further. When, however, young animals were reared to maturity on this diet and then mated, their fer-

TABLE V

RESULTS OF RE-MATINGS ON VARIOUS DIETS   (KING x CASTLE RATS)

DIETS		NO. OF MATINGS	NO. OF POSI-TIVE MATINGS	PERCENTAGE OF MATING FERTILITY	PERCENTAGE OF INDIV. FERTILITY
Stock diet		10	7	.70	.70
Low Fat Sol. Vitamine diet	Proved Unproved	0 20	0 9	.45	.45
Low Calcium diet	Proved	0	0		
Low Protein diet	Unproved Proved	19 0	6 0	.30	.30
Double Defi-ciency diet	Unproved Proved	12 0	6 0	.50	.50
(Low in calcium and protein)	Unproved	0	0	0	0

This table gives the results of remating rats from the negative matings of Table IV with Castle rats of known fertility. Since such Castle rats are of practically 100 per cent fertility the index of average individual fertility of their King rat partners is the same as the index of mating fertility. It will be seen that the individual fertilities of rats on the deficiency diets are so low as to have insured sterile matings with partners of the same grade (see Table VI).

tility was decreased by more than one half (0.31 as compared with 0.65). (See Table IV.)

The diet which was deficient in calcium and the diet deficient in the proteins both decreased fertility to an amount which is noteworthy even from a limited number of experiments, as is shown in Table IV.

In the rats subjected to the double deficiency diet (decreased calcium and protein) there were no pregnancies at all either in previously fertile adults or in rats reared to maturity on the diets.

The results were then checked by remating these individuals with rats of proved fertility from Castle's highly fertile stock as shown in the column of mating fertility in Table V. The results obtained were at first sight altered, but this is due to the high fertility of the partners. They were in fact confirmatory of the percentages given in Table IV, as will be apparent on discussion of the percentages of "average individual fertility" to be taken up now.

Study of these results made it at once evident that in any discussion of the sterile matings produced we must make a distinction between the "mating fertility" of a class and the "individual fertility" of the several animals concerned.

The percentages of individual fertility given in Tables IV and V of course represent the average of individual fertility throughout each class, and this must again be distinguished from the individual fertility of given animals which can only be arrived at by individual testing.

Let us consider the results in detail. On the calcium deficiency diet

6 out of 7 matings were sterile, i.e., the class showed 14 per cent of fertility as compared to 65 per cent on the stock diet. This diet was deficient only in its percentage of calcium and was otherwise an abundant and nourishing diet. It did not produce visible ill health.

On the protein deficiency diet there were only 5 matings and no pregnancy occurred. It is probable that on a larger number of matings there would have been an occasional positive mating and a possibility of calculating their rating. This is supported by the fact that some of these rats were subsequently fertile to rats of higher fertility (Table V).

On the double deficiency no pregnancy was ever obtained in these matings.

The production of so much infertility by such slight change in conditions is at first surprising, but it is rendered much more comprehensible by the theorem which we now wish to bring forward, that a slight decrease of fertility in each of the individuals concerned produces a much greater decrease of fertility in the matings.

If in this connection we make certain assumptions, calculate from them the fertilities which should theoretically be produced, and on turning to the actual results of the breeding experiments, find that the same, or closely similar, percentages were in fact obtained, we may fairly conclude that the assumptions are sustained, in so far at least as the small numbers used warrant any conclusion.

We will assume then that the fertility of a mating may be fairly expressed as the product of the individual fertilities of the individuals concerned, and in written form by the formula

The fertility of the male x the fertility
of the female=the fertility of the mating
or, for brevity — m x f = M

TABLE VI

SCHEMATIC CHART OF FERTILITY

INDIVIDUAL FERTILITY		MATING FERTILITY
1.0 x 1.0		1.00 or 100%
.9 x .9		.81 or 81%
.8 x .8		.64 or 64%
.7 x .7	Threshold for	.49 or 49%
. . . . .45%
.6 x .6	Reproduction	.36 or 36%
.5 x .5		.25 or 25%
.4 x .4		.16 or 16%
.3 x .3		.09 or 9%
.2 x .2		.04 or 4%
.1 x .1		.01 or 1%

The figures in this table vary from those actually obtained from the matings only in being restricted to even tenths for the sake of clearness. The establishment of .45 as the threshold for reproduction must of course be regarded merely as an approximation until larger numbers have been employed.

We will assume that when individuals of the same parentage have been reared under the same life conditions and subjected to the same change in those conditions, their fertilities will be affected in substantially similar degree whether the individual is male or female. Then if in a given class we make 10 matings, of which 5 are fertile, the aver-

Fig. 2.—Stock diet.

Fig. 3.—Low fat solution.   Vitamine diet.

Fig. 4.—Low calcium diet.

Fig. 5.—Double deficiency on war diet

age mating fertility of this class would be 5 and the formula would be $m \times f = .50$, but if in this formula both individuals are of equal fertility it follows that the fertility of either individual is equal to the square root of .50. The square root of .50 is approximately .7

$(.7 \times .7 = .49)$; hence if our assumptions are correct the formula for a class in which 10 matings give 5 fertilities would be $.7 \times .7 = .5$.

Study of a number of such formulæ leads, however, to a further theoretical conclusion,—that somewhere in such a series there must be a point above which reproduction may be expeetd, but below which it will not occur, a "threshold for reproduction" (Table VI).

If we now apply these formulæ to the 23 matings of Dr. King's rats on our stock diet we obtain the following results. There were 31 individuals involved in these 23 matings. In the case of 22 individuals the first mating resulted in prompt reproduction. We may safely conclude that these individuals were of the average mating fertility of
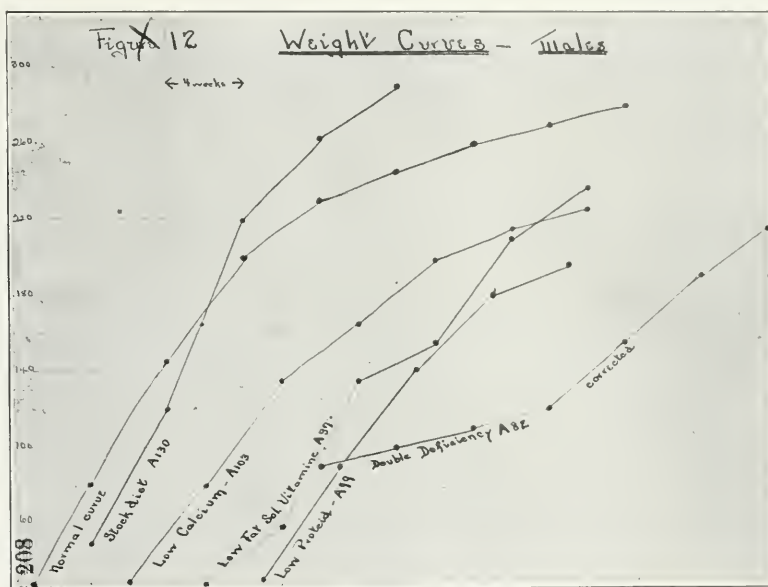
Fig. 6.—Individual weight curves for males.

King's strain which she gives as .8 (the square root of .8 is .9, $.9 \times .9 = .81$) which may then be taken as the individual fertility of these 22 rats. The other 9 individuals all eventually reproduced, but in their case the number of matings required before a result was obtained varied from 2 to 7. Estimating their individual fertilities by the same method, i.e., by the percentage of mating fertility in the whole group of matings in which the individual was concerned, and taking the square root of the mating fertility as the fertility of the individual, adding the individual fertilities of the whole class and dividing by 31 we get an average individual fertility of .82 for the whole group of 31 rats. If these assumptions are correct, or nearly so, this figure (.82) should approximate that obtained by taking the square root of .65

which was our observed index of mating fertility in this class (Table IV). This square root is .81, and the comparison is close enough to warrant the assumption.

The same method was pursued in the establishment of a threshold for reproduction. Taking the total number of matings in which any of these rats figured, which is 33, the appropriate individual index was introduced into the equation for each mating. This gives us a table of mating fertilities ranging from .28 to .90. In some of these matings young were produced; in others there were no young, or, as we have phrased it, some matings were positive and others negative. The column of mating fertilities in Table VI gives in schematic form the results obtained. In practically all the matings which fall above the dotted line young were produced; in practically all those which were below the dotted line the matings were infertile.

In fact, if we so place this "threshold for reproduction" at a mating fertility of .45 there were but two exceptions to the rule. In one case young were produced in a mating with an index of .40, but in this case it was the seventh mating to which that individual rat had been subjected, the six others being infertile. In one case a mating with an index of .49 did not produce young, but this mating was a brief one. It was made and terminated before this point had come into our minds and might have proved fertile if it had been longer continued.

We fully realize that this theory must be marked unproved until it has been tested by a much larger number of matings. We are already engaged, in conjunction with Castle, in repeating these experiments on a scale large enough to be evidential, and shall report the results with him in a later paper. We would only say here that if it is reliable it explains very many otherwise inexplicable facts; for instance, the often repeated observation that two rats mated with each other failed to produce young, but that when each was remated with a partner of higher individual fertility (e.g., a Castle rat) both matings proved positive.* On this theory the explanation is evident. Suppose the rats concerned in a class each had an index of individual fertility of .6, the mating fertility in that case would be .36, which is below the threshold for reproduction and no young would result; but in their rematings with rats whose individual fertility was 1.0, the mating fertility in each case would be .6 and young would result. Again it makes it easier to understand the otherwise extraordinary fact that a merely decreased percentage (not an absence) of calcium without any other change in the conditions of life can (at least in rats) make 6 out of 7 matings sterile, (or the similar results in the other classes). It has long been known in the laboratories that an-

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*Thirty-seven individuals which had had negative matings reproduced with new partners.

imals subjected to highly deficient diets become sterile before they develop ill health. These experiments show that even moderately deficient diets decrease fertility and if this theory is true it explains how a moderate decrease of fertility in each of two individuals must make their mating sterile, as, for instance, $.6 \times .6 = .36$ or sterility.

It is, of course, to be remembered that if a class shows a mating fertility of about .36 this means that 4 matings out of 10 have been fertile. The explanation of the occurrence of these 4 fertile matings with an average individual fertility of only .6, of course. means that with an average fertility of .6 some individuals will be at .7 or higher and that whenever two such individuals meet their mating will be
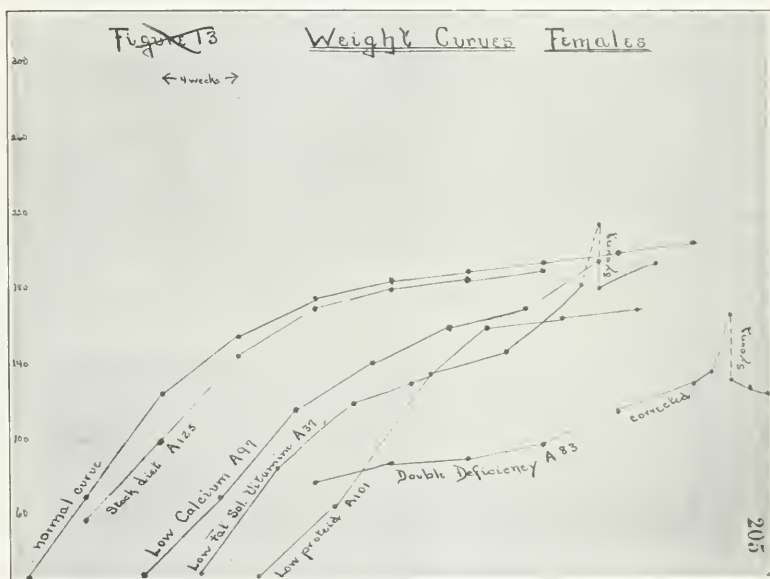
Fig. 7.—Individual weight curves for females.

fertile. Other individuals will be as low as .5 and would probably be sterile when mated with even the best of the class, e.g., $.8 \times .5 = .4 =$ sterility.

One other observation of some interest may be mentioned here. We have been unable to find any mention of the birth of macerated fetuses in the literature and Castle is sure that he has seen no such instance in the many years during which his laboratory has contained large numbers of rats on stock diet. In 32 matings on our single deficiency diets 4 such deliveries occurred and there were 2 more in 8 deliveries in which young rats which had been reared on the war diet were subsequently placed on ample diet and bred to Castle's rats. The possibility that habitual abortion in the human race may be the result of one of the deficiencies in these vital ingredients of diet which are

not infrequently present as a result of faddism or lack of appetite, even in the well fed classes, should be given consideration. We have observed one instance in which five successive abortions occurred in a
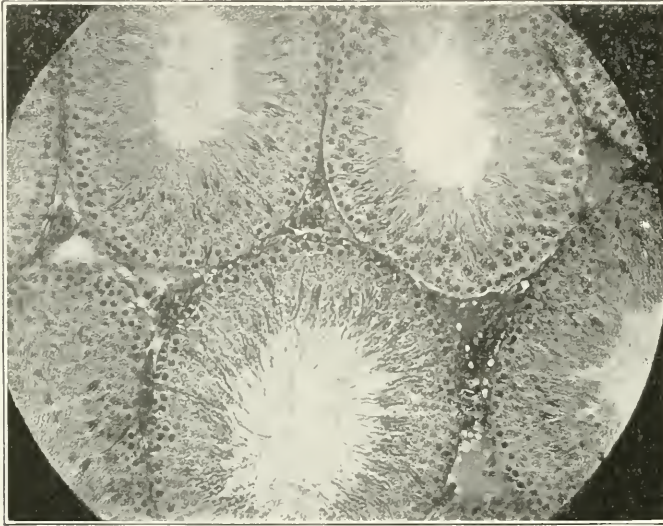
Fig. 8.—Section of testis (x500) from rat made sterile by low fat solution. Vitamine diet.
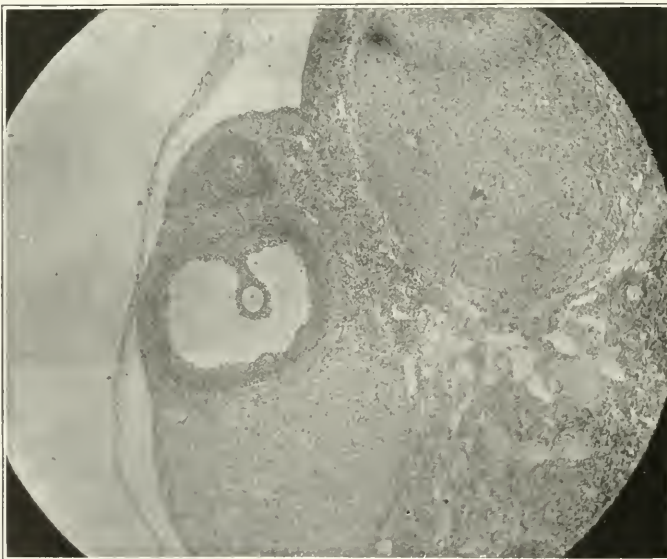
Fig. 9.—Section of ovary (x300) from rat made sterile by low calcium diet.

woman whose diet when analyzed showed such a deficiency, but in whom a sixth pregnancy on corrected diet resulted in a normal child at term.

The work of Steenbock[4] of the Wisconsin Experiment Station shows that calcium deficiency tends to produce abortion and stillbirth in swine and cattle also.
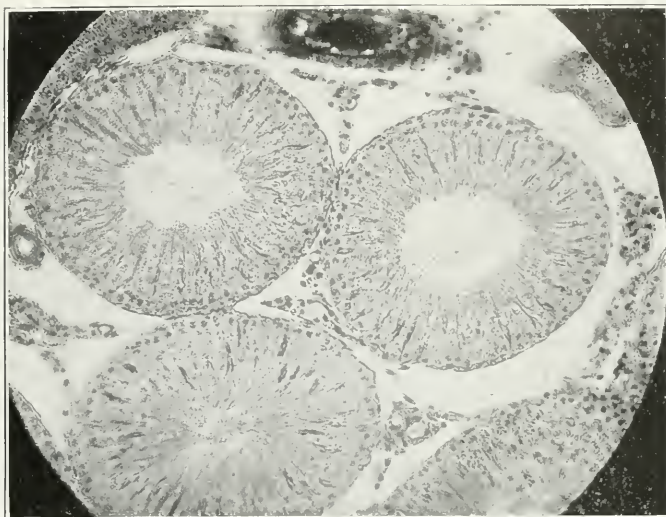
Fig. 10.—Section of normal testis (x500).
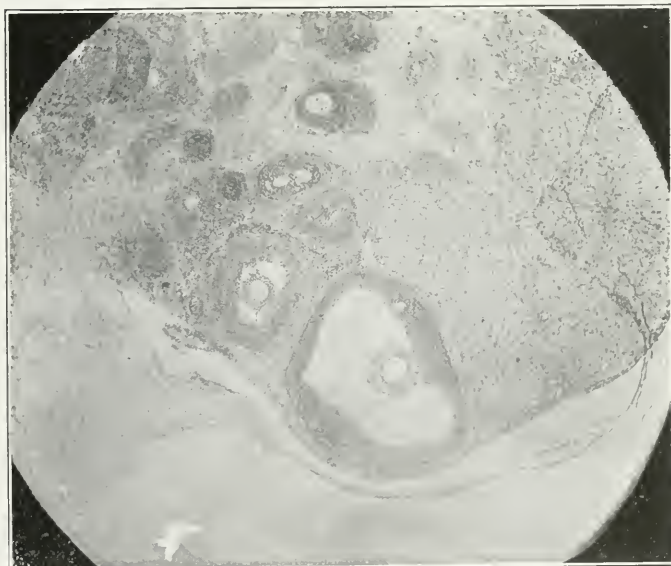
Fig. 11.—Section of normal ovary (x300).

We have stated that the deficiency diets produced no disease or evident ill health (with the exception of the war diet which did produce wasting and in several instances death). Figs. 2 to 4 are photographs

of representative rats from each class and are the best evidence of this fact which we can produce on paper. The condition of representative individual rats in each class is further shown by Figs. 6 and 7 which give their individual weight curves. It will be seen that on the single

Fig. 12.—Section of ovary (x300) from rat made sterile by war diet.

Fig. 13.—Section of ovary (x500) from rat made sterile by war diet. Note the four cells in the follicle.

deficiency diets these vary extremely little from the average normal curve of rats and from the slightly better curve obtained from our stock diet.

The photographs (Fig. 5) and the individual weight curves of rats on the double deficiency diet (low in calcium and protein) show these rats to be in less good health, and this marked change of condition was attended by great loss of fertility, all their matings with each other proving sterile. We have obtained European statistics which show a corresponding decrease in human fertility in the countries of central Europe, notably in Austria, but lack of space forbids the reproduction of these statistics in this paper.

It seemed necessary for completeness that we should study the ovaries and testicles of rats which had been decreased in fertility by these diets. Since we were able to find no extended study of the physiologic condition of the ovaries and testicles of rats in a state of fertility our study of these organs in rats on deficiency diets was necessarily pre-
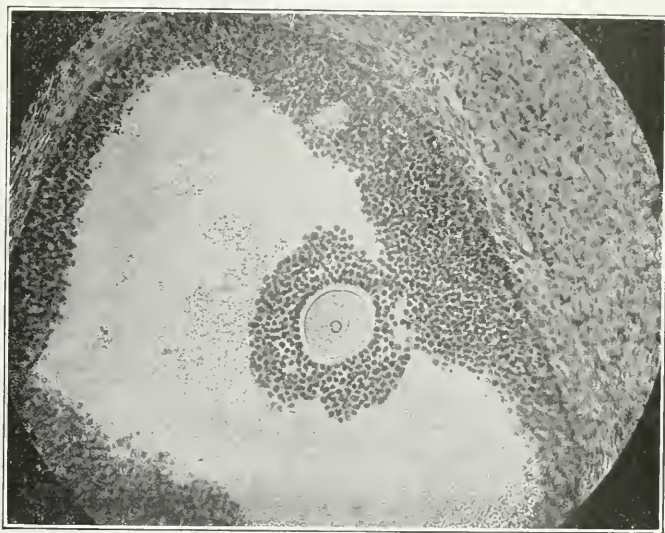
Fig. 14.—Section of normal ovary (x500).

ceeded by the preparation of serial sections of the entire ovary and testicle from stock diet rats in every month from birth to full maturity. With these as standards we compared serial sections of the organs from representative rats in each of the classes which were on deficiency diets. The work of Robinson[5] on prenatal death makes it probable that certain ova, and probably certain spermatozoa, contain within themselves conditions which make complete development impossible; but these conditions may, or may not be, morphologically visible.

Figs. 8 and 9 are sections from the organs of rats on the single deficiency diets. We exhibit them with the statement that when compared with sections from normal animals (Figs. 10 and 11) they show no anatomical changes which have been demonstrable under the methods so far employed.

Figs. 12 and 13 are sections of ovaries of rats on the double deficiency diet with their more extreme infertility. These ovaries do show several peculiar conditions which must be studied further, notably ova contained in unruptured graafian follicles which are composed of four cells. This section is to be compared with a normal ovum under high power (Fig. 14). These may be ova which have undergone premature segmentation, they may represent the development of four ova in a single follicle, we are uncertain what they represent and can at present make no statement about them except that they are plainly abnormal.

CONCLUSIONS

We conclude provisionally: 1. That a moderate decrease in the percentage of the fat soluble vitamine, of the protein, or of the calcium contained in an otherwise excellent diet produces a definite decrease in the fertility of individual rats.

2. That a slight decrease in the fertility of both partners will produce a sterile mating.

3. That the fertility of the mating may be stated as the product of the fertility of the individuals concerned.

4. That if the index so obtained falls below a given point the mating will be sterile, and that this result holds true whether the partners are of equal or of widely different fertility.

5. That these principles explain the fact that two individuals which are sterile when mated together may nevertheless reproduce freely when mated to new partners (of higher fertility).

6. That dietary deficiencies produce a lowered fertility which varies in degree with different individuals though of the same parentage and in the same cage.

7. That diminished fertility sometimes results in the appearance of abortion.

8. That mere percentage deficiency in both proteins and calcium produces visible ill health and great infertility.

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321 DARMOUTH STREET.   (*For discussion, see page 431.*)

A TECHNIC FOR THE MANAGEMENT OF THE LARGE CYSTOCELE WHEN ASSOCIATED WITH NON-MALIGNANT DISEASE OF THE CERVIX AND MYOMATA UTERI

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(*From the Clinic of the Woman's Hospital.*)

THE recognition that cystocele is a true hernia of the bladder and that its repair rests upon the same principles governing surgical procedures for the cure of hernia elsewhere in the body, is a development in gynecologic surgery of the past thirty years. Sims (1871) was the first to completely expose the base of the bladder as it is done today, but he did it quite by accident, and did not employ this method again.

The etiology of the occurrence of cystocele and the principles of fascial support of the bladder we owe to Hadra (1888) and to him belongs the credit for first suggesting in 1889 the freeing of the bladder from the cervix and anterior vaginal wall and "resuturing the bladder to the anterior cervical lip as high up as possible." Hadra considered the point on the cervix where the bladder and vagina are firmly attached to one another to be of especial importance—"as a centre upon which the connection and the mutual support of the three organs depend—and the reattachment and restoration of normal relations between the bladder, vagina and cervix is what we ought to look for." Hadra apparently did not perform the operation, for, after giving this technic, he says "I have had no experience in it but I can promise that the following little operation answers our purpose very well," and describes passing a suture through the vaginal tissue on either side of the cystocele and fastening to the cervix, a procedure similar to that employed by Emmet.

The first, however, to appreciate that a prolapse of the bladder is a true hernia seems to have been Munde,[1] who, in 1890, in an article in the *American Journal of Obstetrics*, of which he was then editor, entitled "True Cystocele or Vesicovaginal Hernia," says that "stitches should include separated muscular fibers of the anterior vaginal wall instead of merely drawing together the vaginal mucous membrane." Two years later Skene in "Hernia of the Bladder" gives credit to Munde for this conception of cystocele as a bladder hernia and describes an operation which he had performed on the principle for

repair of hernia. The freeing of the bladder was, however, limited "to the extent of the hernial opening in the muscular layer of the vagina," but the lateral edges of the muscular layer of vagina he brought together with sutures. This, so far as I have been able to find in the literature, is the first operation undertaken for cystocele with the knowledge on the part of the operator that he was dealing with a hernia and the intent to effect a cure by freeing the bladder from the vaginal wall and then bringing together the separated muscle in the wall of the hernial sac.
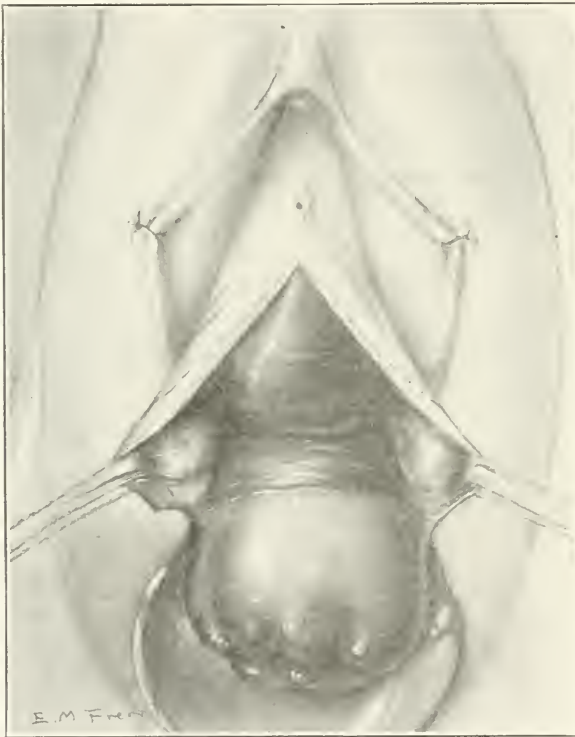
Fig. 1.—Cystocele associated with diseased cervix and myoma of the fundus (with or without procidentia).*

The operation of "vaginofixation" associated with the names of Mackenrodt, Sänger, Dührssen, Schücking and others was the forerunner of the interposition operation and the improved operation of cystopexy. Mackenrodt did the operation first in 1888 by passing a suture through the cervical canal and fundus of the uterus to the vesicouterine attachment and vagina without freeing the bladder. As the bladder was in danger of being injured by this stitch, Mackenrodt later made the opening of the vesicouterine peritoneum a preliminary step to the operation, but never freed the bladder extensively.

*Figs. 1, 2, and 3 are after Ward's technic for cystopexy and amputation of the cervix. Fig. 4 from Martin's Heftapparat.

The next in order chronologically seems to have been the "flap" splitting method of Sänger." The technic of flap splitting was first applied to the repair of the pelvic floor by Lawson Tait, and by Sänger somewhat later. Sänger applied this technic to the anterior vaginal wall and the operation generally bears his name, but he himself in 1892 gives credit to Gersuny and Arx for being the pioneers in this work. While Sänger approved of bladder separation from the anterior wall of the vagina far out laterally on either side, he disapproved of its separation from the uterus and in this point differed from both Arx

Fig. 2.—Freeing of the bladder and cutting off the thinned-out sac. Amputation of the cervix. Alexandroff's stitch and angulation of the vagina. (Note that the bladder is not attached to the anterior surface of the uterus, but left free.)

and Gersuny who separated the bladder from the uterus but not so high as the peritoneal attachment which they left intact. Arx is the first to mention the elevation (Einstülpung) of the bladder as an important step in the operation but he accomplishes this by turning the bladder mucosa upward into a ridge or cone within the bladder after the method of Emmet. Gersuny and Martin both employed this infolding of the bladder wall which they maintained by interrupted sutures.

The first description of an operation performed after the technic

suggested by Hadra was that given by Stone, of Washington, (1889) who separated the bladder from the uterus and after excising the thinned-out portion of the vaginal wall sutured it to a point on the anterior surface of the uterus on a level with the origin of the round ligament and then opened the abdomen and made "a further separation of the bladder from the uterus and sutured the reflexure to the scarified surface of the uterus near the fundus." If he considered it advisable, he also did a ventral fixation.

It has been of no little interest to me to trace the origin of the transposition operation or as it is known in German literature, the interposition operation. I was a student in Vienna when the discussion was
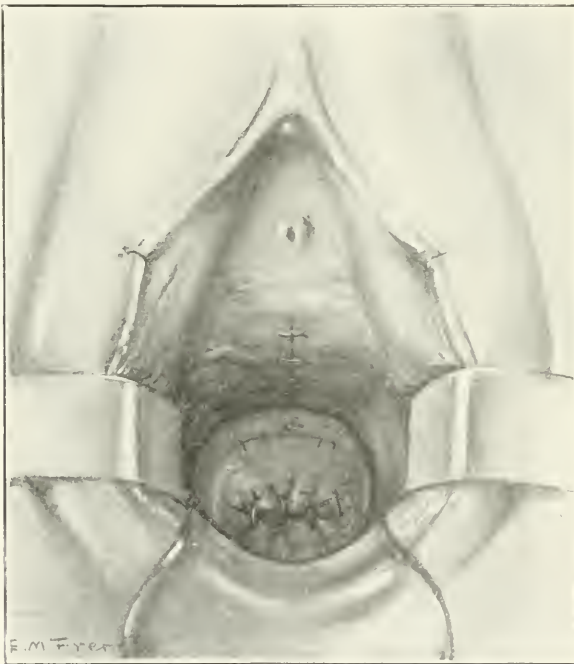
Fig. 3.—Vaginal part of the operation completed.

keenest as to whether the credit for priority belonged to Schauta or Wertheim, and as I was for several months in the clinics of Schauta at the Krankenhaus and also in the clinic of Wertheim at the Kaiserin Elizabeth Bettina Pavilion, I had ample opportunity to hear this discussion from both sides,—but I never heard any credit given to an American surgeon. As the operation is known today in German text books as the Schauta-Wertheim operation, I think it may not be amiss to present the facts in detail.

In 1894 Dührssen reported a series of 250 cases upon whom he had done a "vaginofixation" operation. I mention this because Dührssen

has been credited sometimes as being the first to do the transposition
operation, but there is nothing in his report to warrant this assertion.
Dührssen did incise the vesical peritoneum frequently to avoid injur-
ing the bladder, but his technic is that of Mackenrodt in vaginal fixa-
tion of the fundus of the uterus in cases of retroversion.

In 1896 Freund, when operating for prolapse, made a posterior
colpotomy incision and brought the fundus through the opening into
the vagina and fastened it to the walls of the vagina. The uterus thus
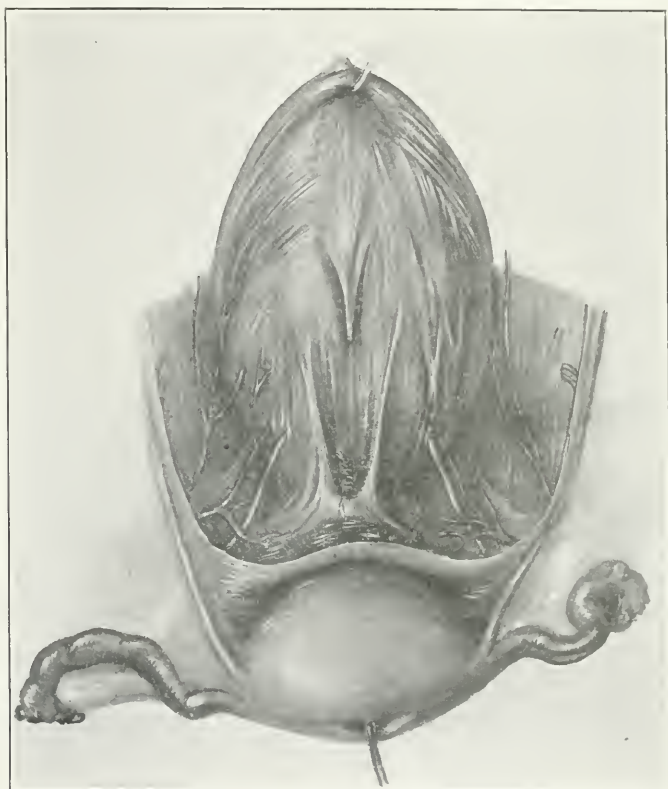
Fig. 4.—The bladder has been completely freed from its vaginal attachments.   (Note stitch
plicating the tissue and attaching the bladder to the cervix.)

lay in the vagina without any vaginal covering. Freund then made an
incision in the fundus for the purpose of drainage.

On January 28, 1898, Thomas J. Watkins, of Chicago, performed a
transposition operation precisely as it is done today, bringing the fun-
dus of the uterus below the bladder, fastening it there and suturing
the vaginal flaps anterior to the fundus. This operation was reported
in the *American Gynecological and Obstetric Journal* for 1899 (xv, 420).

On January 10, 1899 (this is one year later than Dr. Watkin's opera-
tion) Wertheim, who said he had in mind Freund's technic, when

operating to cure a large vesicovaginal fistula, brought the uterus into the vagina by an anterior incision and fastened it under the bladder and *anterior to the vaginal flaps*, so that it lay uncovered in the vaginal canal. On January 18, 1899, Wertheim employed the same technic for a large cystocele associated with prolapse. This operation Wertheim reported in the *Zentralblatt für Gynäkologie* in April, 1899.

Some time after this Dr. Josef Halban (who was then assistant to Schauta, at that time chief of the Gynecologic and Obstetric clinic) when operating upon a patient according to Wertheim's technic, and at the suggestion of Schauta who was present in the operating room, fastened the vaginal flaps anterior to the fundus of the uterus, as Watkins had done in his first operation. (This was a personal communication from Dr. Halban to me while I was working in the clinic.) The credit therefore for this operation belongs neither to Schauta nor to Wertheim, but belongs rightfully to Watkins who antedates them both in the transposition of the bladder and the attachment of the vaginal flaps; and the operation should be known as the Watkins' transposition operation.

Löwit in 1909 reported a transperitoneal vaginal supravaginal resection or amputation of the body of the uterus and utilized the cervix, (by sewing it into the vesicovaginal septum), to support the cystocele after the manner of a Watkins operation.

In 1915 Vineberg amputated high up the body of a chronically fibrosed uterus, and, after amputating the lower portion of the cervix, utilized the midcervical portion or stump by suturing it to the subpubic fascia and to the anterior vaginal wall, thus forcing the bladder "to take a position within the abdomen."

In 1902 Alexandroff described the technic, now known by his name, of placing a stitch through the base of the broad ligaments on either side of the cervix drawing them forward and fastening low down on the anterior wall of the cervix, thus making a buttress of them and elevating and forcing the cervix back in the pelvis, a method described later by Tweedy.

In 1901 Reynolds laid down the "principles underlying the repair of cystocele or governing repair of hernia elsewhere," viz.:

1. To ascertain and utilize the natural supports.

2. To avoid using any part of the overstretched wall. Excision of the thinned-out portion of the anterior wall was done by Noble in this same year, 1901, and Dudley, 1903.

In 1904 Goffe more thoroughly applied the principles employed in repair of hernia and freed the bladder completely from its cervical attachment, overcorrecting the prolapse of this organ by elevating the

bladder base and reattached it high up on the anterior wall of the uterus, and broad ligaments, excising the thinned-out portion of the vaginal sac with the intent to

1. Provide good support for the bladder below.
2. Restore suspensory supports above.
3. Do away with redundant folds of bladder wall at its base.

This spreading out of the trigone of the bladder and its attachment to the face of the uterus and broad ligaments insures, not only a firm supporting surface, but prevents infolding of the bladder wall, as kinking of the ureters with stagnation of urine and consequent irritation of bladder mucosa or cystitis.

In 1907 Noble advocated this same technic and by sutures placed in
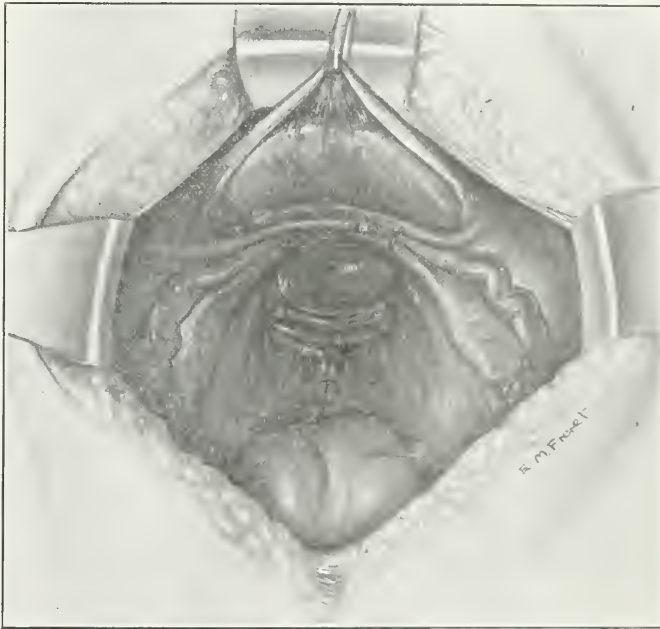
Fig. 5.—Supravaginal hysterectomy has been done and the round ligaments (and the tubes and ovaries if not removed) fastened anteriorly to the stump of the cervix *at the same level* and to the uterosacral ligaments posteriorly to *form a platform* upon which to spread out the bladder.

the cervix directly below the bladder gave more firm support the base of the bladder wall, a method reported in 1913 by Lockyer.

Edouard Martin in 1912 in an anatomic study of the genitalia demonstrated the pubocervical ligament (bladder pillars), the importance of which have been confirmed by Frank in 1917 and Rawls in 1918 in their work on cystocele. The reattachment of the vaginal wall together with this ligament restores the invagination of the cervix to normal or to an overcorrection, as in hernial repair elsewhere.

The overlapping of the fascia below the bladder was first reported

by Rawls and Bissell and to the latter and to Mayo should be accredited the operation of uniting the broad ligaments and placing the bladder above after the complete removal of the prolapsed uterus.

The recognition of the supporting and elevating power of the uterosacral ligaments somewhat antedates the above as attention was called to this factor in restoring prolapse or displacement of the uterus by Wertheim and Mandl, Bovée and Noble.

So far mention has only been made of the repair of the cystocele from the vagina, but as early as 1890 the cure of the cystocele was sought by the abdominal method.   Byford at this time operated
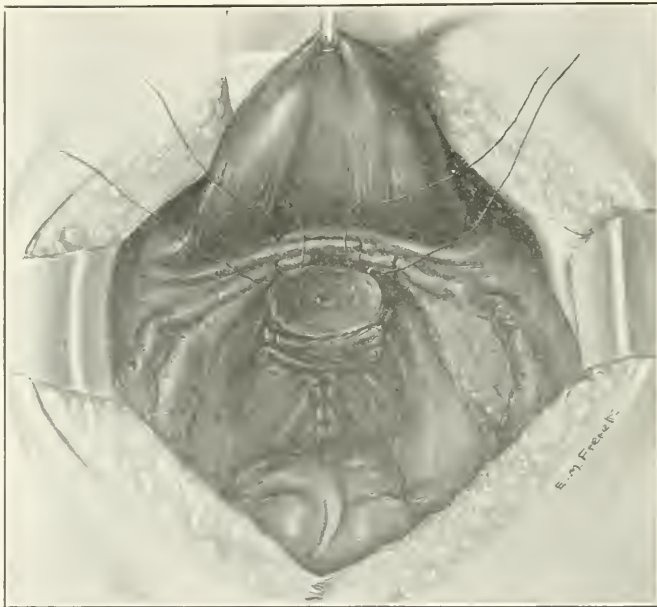
Fig. 6.—Two stitches tack the bladder to the anterior part of the platform.

through the inguinal canals, fastening the tissue on either side of the bladder to the incision.

Lawson in 1898 by suprapubic incision freed the bladder and sutured it to the sheath of the rectus.

In 1903 Dickinson suspended both bladder and uterus to the parietal peritoneum or by actual "fixation of bladder and uterus directly to naked muscle and fascia."

Polk in 1909 presented a technic for restoration from within the abdominal cavity of the prolapse of the uterus when associated with cystocele. The anterior wall of the vagina was plicated from above, and the uterus, if retained in situ, fastened well forward. If supravaginal hysterectomy was done the round and broad ligaments on either side were sutured to the stump of the cervix and the uterosacral

ligaments cut and after crossing them over the stump were sutured to its anterior surface.

In 1919 Ward in the "Problem of the Cystocele" gave a complete résumé of the salient points in the etiology of the occurrence of hernia of the bladder and the technic for its repair, emphasizing the composite nature of the injury and the necessity to correct all the lesions in order that there "should be no weak link."

The technic of the operation I am about to present, so far as it pertains to the vaginal work, follows closely the method laid down by Ward and in the freeing and elevating of the bladder from within the abdominal cavity and the suturing of round and uterosacral ligaments to the stump of the cervix, is very similar to the technic of Polk, although I was not acquainted with the latter's work until I had done four cases.

CASE 1.—Mrs. Q., W. H. 22949. Op. June 27, 1919; one hour and forty-five minutes. Alexandroff; combined vaginal and abdominal cystopexy; rectopexy; hysterectomy, supravaginal (platform); salpingo-ooprorectomy; shortening of uterosacral ligaments; appendectomy.

CASE 2.—Mrs. I., W. H. 23676. Op. October 4, 1919; Alexandroff; combined vaginal and abdominal cystopexy; hysterectomy, supravaginal (platform); shortening of uterosacral ligaments; appendectomy.

CASE 3.—Mrs. C., W. H. 25231; Op. February 20, 1920; 1 hr. 15 min.; Alexandroff; combined vaginal and abdominal cystopexy; op. for incontinence of urine (Kelly); rectopexy; hysterectomy, supravaginal, (platform); salpingo-oophorectomy, (bilateral); shortening of uterosacral ligaments.

CASE 4.—Mrs. R., W. H. 27274; Op. Feb. 11, 1921; 2 hrs. 9 min., amputated cervix; Alexandroff; combined vaginal and abdominal cystopexy; rectopexy; hysterectomy, supravaginal, (platform); shortening of uterosacral; appendix previously removed.

INDICATIONS FOR OPERATION

Occasionally one meets with a case of large cystocele associated with a very much hypertrophied, badly torn cervix necessitating removal, and in the fundus large myomata, the removal of which by the vaginal route would be an impossible or difficult operation attended with great loss of blood and danger of infection. If in addition to this one finds on examination that there is no prolapse associated with the condition, it becomes impossible to reef the broad ligaments below and place the bladder above as in vaginal hysterectomy, or after complete hysterectomy from above to leave the bladder so supported that recurrence of the cystocele is not probable.

The following technic is therefore presented as having been satisfactory in four cases where an enlarged fundus and diseased cervix necessitated their removal, but the large cystocele associated required
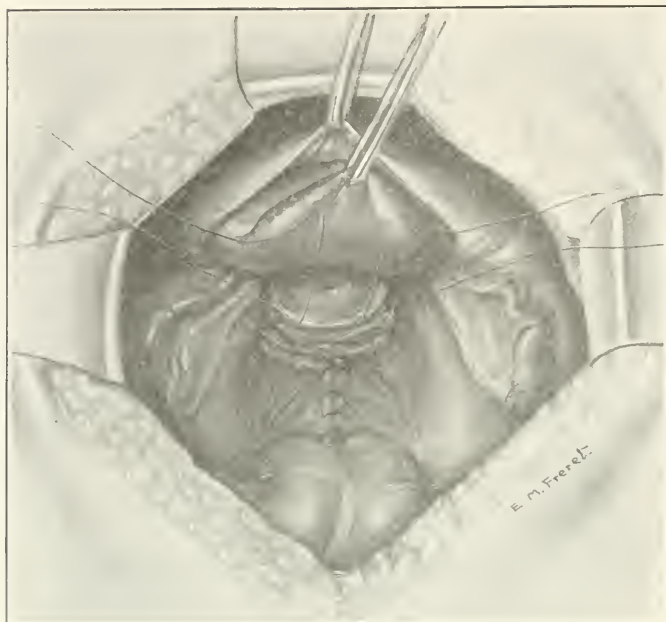
Fig. 7.—Two other stitches complete the attachment of the bladder to the platform posteriorly.
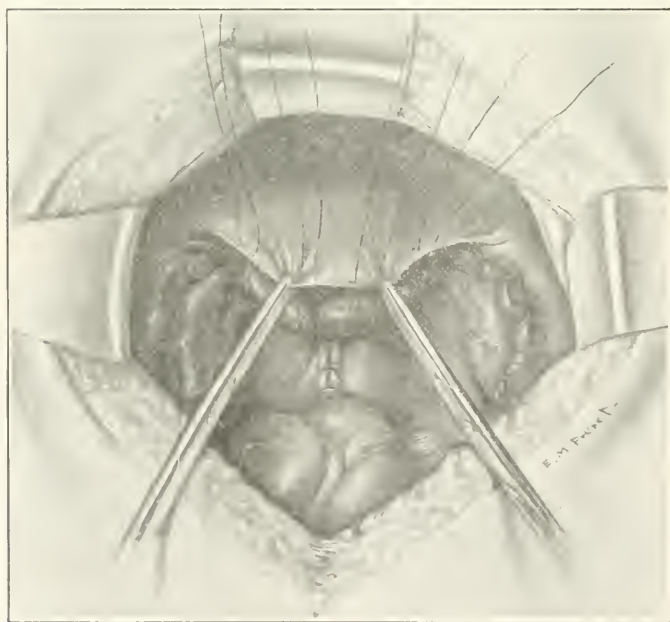
Fig. 8.—The free edge of bladder peritoneum (vesico-uterine fold) is sutured to the peritoneum to more firmly anchor the bladder in position.

a good support for its cure. A repair of the pelvic floor is an essential part of the technic although not shown in the accompanying illustrations.

CONCLUSIONS

1. This technic provides a good support for a cystocele when both fundus and cervix of the uterus must be removed.

2. The firm cervical attachments of the broad ligaments are maintained and the base of the broad ligaments, uterosacral and round ligaments are all utilized to secure pelvic support for the bladder.

3. Bladder is spread out over a platform which prevents any considerable degree of infolding of the bladder wall or kinking of the uterus.

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611 WEST 110TH STREET.

STERILITY STUDIES. SIMPLIFIED METHODS IN DIAGNOSIS*

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SIMPLICITY is art. If, therefore, by reviewing the facts adduced from several years of constant research in the subject of sterility we can finally arrive at a simplified method of studying the individual case which reduces the distasteful elements of such study to a minimum, both for the physician and for the patient, and also outline a short-cut procedure for determining the lesion interfering with conception, we shall feel that we have attained one of the essentials of a perfected technic.

The study of sterility has many discouraging features. Much clinical experience has been accumulated and often it is contradictory. Exceptions are hard to account for; many preconceived impressions are reluctantly abandoned, and, finally, the percentage of cures which we can honestly claim, is small. Two years ago I was visited by a gynecologist of another city who asked me why I had published so little lately on the subject of sterility. I replied, with some emphasis, that I was discouraged with the work, that I knew little about it anyway, and did not propose to write until I had something definite to say.

While the general results of my work still seem meager, spectacular success occurs from time to time, and a review of the individual cases during recent years discloses facts about results which are interesting and promising.

My study showed that by far the larger proportion of patients were hopeless from the start. But hope springs eternal regarding fertility. Many patients were older than forty. Once a physician of sixty-five from a neighboring state, came with his wife of fifty-two. Another large group is made up of cases of male deficiency, and this finding frequently terminates the case. Not a small proportion of cases were those presenting frank histories of gonorrheal pathology. Of the latter group I am at present taking a more hopeful view, for reasons which I expect to outline in a later paper. Still a smaller group, but one I approach with little enthusiasm, is that of patients who give a suspicious history of morbidity following a useless curettage. Curetting has no place in the treatment of sterility except as a means of examination when symptoms suggest a diseased endometrium. Constantly I hear in my office, "The doctor found nothing wrong with me so he said he would operate and scrape the womb." The members of this society do not need to be instructed, but as teachers and consultants

there is a moral responsibility upon us to warn the profession and the public of the dangers of the curet. My effort tonight will not be in vain if I have contributed something toward spreading this important precaution. The analysis of these groups shows definitely that a better prognosis will be possible in sterility when the public and the profession are acutely aware of the need of early, competent study.

Of necessity one's work in sterility will not, therefore, be brilliant, and I advise and practice modesty in my prognosis to these anxious patients. Also I never tell a patient unreservedly that she cannot become pregnant (except when hysterectomy has been personally performed) for there is no mistake which may be so humiliating and disastrous.

The problem of sterility is usually first presented to the gynecologist and I think it entirely proper and practicable that the initial study should begin with the gynecologic history and examination. This is not the place to discuss such elemental matters as history taking, but I do want to emphasize that I see no reasonable excuse for including in such a history any unusual questions of an intimate or embarrassing nature. Long ago I concluded that the knowledge gained by such inquiry was not pertinent to the subject and there is no surer way to discourage the earnest cooperation of the patient, which is such a valuable asset in the work. No other comment will be made upon the history. In the physical examination more than usual stress should be given to evidence of underdevelopment and endocrine disorders.

THE EXAMINATION

Absolute classification of patients is impossible, but the gynecologic examination relative to sterility will disclose three general groups:

1. Cases with a gross pathology which entirely precludes pregnancy; or which renders pregnancy a dangerous complication. Also conditions which, while likely to cause sterility, have themselves an importance superseding sterility. This group of cases may be ruled out at once as not belonging to sterility problems.

2. The second group includes those patients with minor pelvic lesions, discovered incidentally, which have an importance due chiefly to the possible relation they bear to the interference of pregnancy. I refer to the flexions and uncomplicated versions of the uterus; so-called conical cervix with pinhole os; mucus plug obstructing the cervix; tilting of the cervix out of the seminal pool, *et cetera*. Much has been written as to their causative relation, but we are concerned with questions which actually determine their rôle in the individual patient. We may specifically state that the responsibility of such a lesion may be inferred only when the favorable character of all other essentials to fertility is demonstrated. When cases are thus studied, the contention of those who claim that these lesser pathologic condi-

tions are very rarely responsible for sterility will be confirmed. They have been considered responsible, in my opinion, largely, because they are so often associated with sterility as the symptom-complex of under-development.

3. In the third group may be placed those patients in whom the examiner fails to find any abnormality.

THE INSEMINATION TEST

The next stage of the study, applicable to the last two groups, is conducted on the second visit. I term it the "insemination test," and it consists simply of studying the condition and motility of the

· STERILITY STUDY ·
(TRACED FROM LIFE 6×1)
ANTEFLEXION: STIGMA OF UNDER-DEVELOPMENT?
ACQUIRED FROM POSTERIOR PARAMETRITIS?
SOUND ALWAYS SHOWS LESS ANGLE THAN DI-
GITAL IMPRESSION. IMMEDIATE LOSS SEMEN POOL AND
POSITION OF EXTERNAL OS ARE IMPORTANT FEATURES//
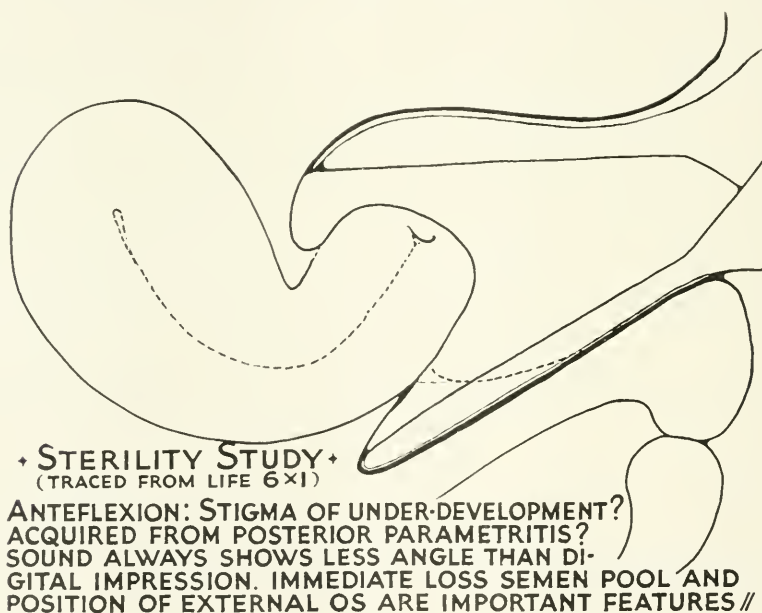
Fig. 1.

*Figs. 1, 2 and 3 are after Ward's technic for cystopexy and amputation of the cervix. Fig. 4 from Martin's Heftapparat.

spermatozoa in the reproductive tract of the recipient approximately forty minutes after coitus. Comparative findings are impossible without systematic study. This interval was originally specified as about the time necessary to permit the patient to reach the office. By test it was found also to present the most definitely favorable condition for study. I have found it practicable to set aside Sunday and one other morning a week for this work. The husband should be informed as to the nature of the investigation and a definite appointment for the wife's visit made a few days in advance to insure favorable circumstances for study. Out-of-town patients avail themselves of a near-by hotel. A couple sincerely interested in childbearing will not offer ob-

jection to a plan so easily executed and one devoid of artificial and distasteful features. I have gained acquiescence to this simplified program in every instance except one and the husband who objected related at my office the following day a history of double epididymitis just before marriage. At the appointed hour I have ready on a table, beside the examining table, a warm microscope and a warmed tray, which I call the sterility tray, which contains the following articles: clean glass slides with blank labels, cover glasses, litmus paper, and numerous pipettes of various types and sizes including Skene's pipettes, some of which I have modified so that they may be most useful for obtaining specimens from the cervical canal, or for injection in the tube patency test which I shall describe later.

The patient, having arrived at the appointed hour, is prepared, with loosened corset, in the usual dorsal position. The vagina and cervix are exposed with a warm speculum introduced without lubricant, for obvious reasons. The examination should proceed at once. Under normal conditions, the examiner will find a pool in the vaginal sulcus varying greatly in amount, but averaging about a dram, consisting of seminal elements mixed with vaginal secretion. The pool is thin in density; slightly alkaline in reaction; and when transferred to the microscope shows a field swarming with vigorously moving spermatozoa amid vaginal and seminal debris. To avoid errors of contamination, the vagina is now dried and if mucus is protruding from the cervical os a specimen is taken for examination. This mucus is then removed and specimens of mucus taken from the cervical canal up to the internal os. Some difficulty may be experienced in obtaining tenacious mucus, but with patience and a trial of different pipettes, avoiding roughness that causes oozing, specimens will be obtained which, when spread under a cover glass, will show from four to sixteen active sperm cells to a field. Cells which have made this progress to the cervical canal are almost invariably normal as to morphology and mobility showing Nature's simple plan that only the fittest shall survive to perpetuate the species. Vaginal elements are sometimes found in the cervical canal. In connection with this, I wish to say that a peristaltic action of the uterus as a phenomenon of the orgasm seems proved, for, in experimental study I have found spermatozoa with vaginal epithelium, and other elements well within the cervical canal immediately after intercourse. Thus may be explained the contradictory experience as to the value of the douche as a contraceptive measure.

DEFECTIVE INSEMINATION

The absence of the male element in the vagina or the presence of seminal fluid but with few or no spermatozoa, establishes at once the male responsibility and the problem is transferred to the genito-

urinary surgeon. Again, if the examination demonstrates a normal pool retention with the usual sperm content but without motility or with few active cells; or with sluggish activity with decreased or absent motility in the cervical canal only two conclusions are possible: either the male element has been deficient from the first or, having been normal, has been adversely affected by the vaginal secretion. To determine which is the correct hypothesis our investigation must be temporarily diverted to the husband. A specimen obtained directly in one of the methods described previously before this society,[1] is examined after the lapse of forty minutes just mentioned. Gross errors will result if this technic is careless; but if correctly carried out, one may reach conclusions with confidence. It was some time before I acquired the courage to ascribe sterility to male specimens of partial deficiency. I have nothing of greater importance to state tonight than that while a specimen with some motility is theoretically capable of impregnation, experience has shown that pregnancy does not occur if the male product is definitely weak. Many couples come to me with the statement that the husband has been examined and is "all right." In checking up this finding I am convinced that the average examination proceeds no further than the demonstration of some active cells. One husband said he had made a diagnosis himself of normality, for, after the doctor put the specimen under the microscope, he plainly saw things wiggling. Cooperation of an associate in genitourinary diseases will invariably show vital anatomic or functional troubles in the men having decreased activity of spermatozoa and there is no reason to modify the statement, made some years ago, that when our investigation has proceeded thus far—practically after two visits—fully fifty to sixty per cent of the cases will be eliminated as gynecologic problems.

If the male specimen obtained directly proves fertile and a second insemination test shows its vitality to be again destroyed, the adverse action is shown to be definitely in the vagina. In our experience this has always been due to hyperacidity though others have ascribed it to a toxicity of bacterial origin. The latter is a reasonable assumption and worth investigation. Hyperacidity may be assumed, if the vaginal pool is found definitely acid. Spermatozoa soon die in such a medium. Hyperacidity is a relative term in sterility and we do not ascribe to it the importance which was formerly noted. This test, however, affords a means of fixing its responsibility—definite and destructive in occasional instances. The spectacular cures sometimes following alkaline douches are thus accounted for, but the reverse does not hold good that hyperacidity is ruled out by the haphazard use of bicarbonate of soda or sodium hydrate douches, for marked vaginal acidity is not so easily corrected.

When in cases of the second group a normal semen is demonstrated

and the patient is free from any suspicion of pelvic inflammatory changes, one is justified in studying and correcting these minor lesions as a possible etiologic factor. No discussion regarding treatment shall be given here. Flexions and other anatomic signs should encourage investigation of delayed development and appropriate treatment. There are more cases of this type than is commonly thought. Correcting a version may clear up an endometritis or some other unfavorable condition. Cures will certainly follow in a certain proportion of cases from the use of a pessary; or from dilatation of the cervix, with or without stem insertion, and for reasons that are not always definitely explainable.

When the minor lesion of a patient in group two is corrected for several months without pregnancy occurring, the patient automatically belongs in group three, that is, patients without demonstrable pathology. When spermatozoa are traced in normal activity to the internal os we may assume that in these patients sterility is due either to deficient ovum production, or a blockade in the fallopian tubes, or, possibly, a change in the endometrium which prohibits growth. Very frequently indeed, upon the conclusion of the test at the second visit of the patients, who formerly were particularly puzzling because so normal, the etiology of the sterility may be fixed within these narrow limits. Delay in development; illness or hard work during the years of puberty; absence of normal instincts; disturbed function, such as scant menses or intermittent amenorrhea may strongly point to endocrine deficiency, involving the ovary, but not conclusively proving absence of ovulation. The study of this relation offers an opportunity for valuable research.

In by far the largest percentage of cases in this group the lesion is in the fallopian tubes. It seems we have been grievously slow when studying these cases to recognize that the tubes are frequently sealed by gradual processes, other than gonorrheal or tuberculous, and without marked symptoms or palpable pathology. Probably each of you in performing a laparotomy has often had the experience of finding sealed tubes in patients who gave not the slightest suspicion of it either in the history or the vaginal examination. Many of these obstructions probably develop from the action of the colon bacillus.

Appreciating the difficulty of recognizing this important lesion, I proposed some years ago to prove the patency of the tubes by radiography after collargol injections into the tubes.[2] This proved impractical, but suggestive. If we cannot claim that this problem is already solved, at least the study is well on the way. Rubin has proposed, and is using, a most ingenious method of proving tubal patency by demonstrating the injection of oxygen into the peritoneal cavity

through the uterus. I have for some time been developing another method, similar in principle, by demonstrating the injection of sterile normal saline solution through the tubes by carefully measuring the amount injected in excess of the 8 or 10 minims known to be the capacity of the uterine cavity. In other words, by experimental injection through the uterus, just before laparotomy, we found that the reception of 16 minims of solution means escape through a tube. The possibility of such a test was first suggested to me in attempting artificial impregnation. In some patients the injection proceeded easily with definite peritoneal reaction. In others there was an equally definite limitation to the injection and almost no progress was made. After a little experience, the ease with which the solution is injected is as significant as the amount introduced.

When by a process of exclusion, as represented by the insemination test, the cause of sterility is practically limited to the tube or ovary, the history of associated findings will usually make the differential diagnosis possible. In my opinion the necessity of proving the patency of the tubes will be exceptional. I limit the test to the most carefully selected patients who give no definite past history of pelvic inflammatory disease and when two pelvic examinations have caused no reaction.

TECHNIC OF INJECTION TEST

The injection test has simplicity to commend it. Freshly made normal saline solution is used and is boiled immediately before injection. Pipettes with the Skene curved tip of varying sizes, are used. The pipette is chosen which snugly fits the individual patient and is carefully sterilized. Sixteen minims of the solution are taken up in the pipette. The patient with emptied bladder and removed corset is placed in a perfect knee chest position and the cervix exposed with the Sims speculum. The vagina is wiped dry and the external os sponged free of mucus. Mucopurulent material in the canal is considered a contraindication to the test. Strips of dry paper are placed in the most dependent part of the vagina to aid the eye in detecting escape of the solution around the pipette. The pipette is now snugly engaged in the canal of the ungrasped cervix. Gentle pressure is then exerted upon the rubber bulb, tightly tied to avoid leak, and a headlight fixed upon the pipette and cervix. Moderate pressure is steadily exerted and the patient instructed to take a deep breath. It is surprising how readily the saline disappears if either tube be open. If they are closed no headway will be made; the pipette will be removed with most of the saline still in it, or leakage will occur about the pipette which, even if undetected by the eye, will soak the tell-tale strips of paper. No immediate

discomfort to the patient follows the successful injection, but about three hours later a definite peritoneal reaction occurs with some pain in the nature of a colic. Patients are told to expect this and to stay in bed over the anticipated period. Larger amounts of saline are unnecessary and are cautioned against because of the more painful reaction.

That this test, applied for purposes of diagnosis, may possibly also be responsible for the opening of a sealed tube, was demonstrated in the patients, previously referred to, who were laparotomized after an injection into the tubes. I am of the opinion that, except in vaginal or cervical disease, when artificial impregnation succeeds it does so because occasionally a blocked tube is thus opened. This is the only
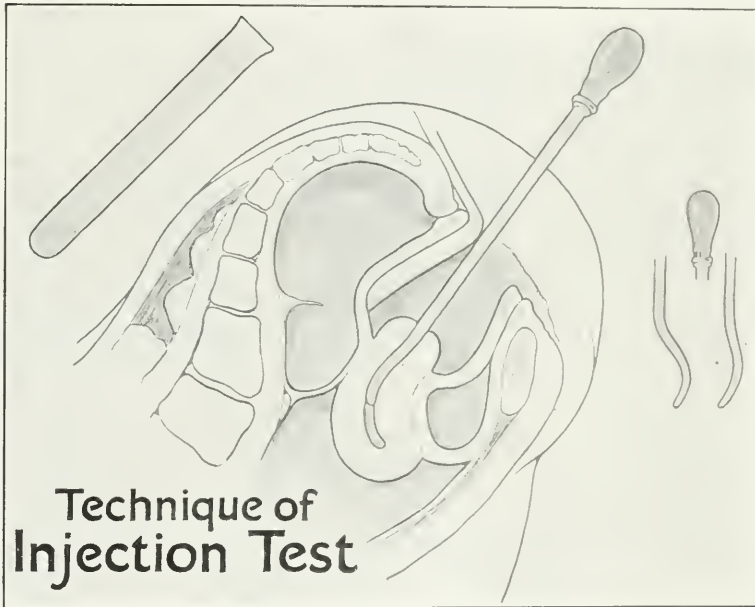
Fig. 2.

rational explanation and for this reason I have practically abandoned attempts at artificial impregnation except to facilitate the passage of spermatozoa through the cervical canal. If my opinion is correct, normal saline is certainly safer for purposes of injection than is seminal fluid. The possibility of carrying infection to the peritoneal cavity by this method is recognized if the technic be careless and the cases improperly chosen. If, however, we have confidence in the peritoneum allowing us to close the abdomen without drainage after hysterectomy, incising across the cervix or vaginal cuff, and if we contaminate the peritoneum with the contents of tubes with impunity, why should our confidence in the peritoneum be abandoned in the instance of this lesser danger?

STERILITY
CASES
GROUPED.

1. GROSS PATHOLOGY PRECLUDING PREGNANCY OR RENDERING
PREGNANCY DANGEROUS. IMPORTANCE SUPERSEDING STERILITY.

60% ELIMINATED AS
GYNECOLOGIC PROBLEMS

2. MINOR LESIONS

INSEMINATION
TEST

DEFECTIVE

DEFICIENT SEMEN

DESTRUCTION BY ABNORMAL
VAGINAL OR CERVICAL SECRETION 5%

MINOR
LESIONS,
CORRECTED

MINOR LESIONS
2ND GROUP
CORRECTED

3. No LESIONS
DISCOVERED

NORMAL, 3RD GROUP

35%

EXCLUSION

OVARIAN
DEFICIENCY

HISTORY

TUBE
OBSTRUCTION

INJECTION
TEST

Chart 1.

CONCLUSIONS

While one's results in treating sterility may not be brilliant, the prognosis would be greatly improved if patients sought competent study earlier.

The indiscriminate use of the curette in the treatment of sterility is to be emphatically and unconditionally condemned. In the hands of an expert it may be condoned as an instrument of diagnosis; rarely for treatment.

Further study confirms that the husband shares equally the responsibility for sterility. Casual reports of male virility are not to be accepted. Sterility may be attributed to partial defects of the semen. These cases offer an excellent prognosis.

A simplified method of studying sterility, original[3] only in its application, is presented as outlined in the accompanying chart. It eliminates most of the unpleasant features of previous methods and enables a quick and definite diagnosis of the inhibiting lesion.

Finally, a technic, for proving the patency of the fallopian tubes in carefully selected cases, is elaborated, which is so simple as to be available to any gynecologist of ordinary training and equipment.

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A PRELIMINARY REPORT ON THE TREATMENT OF SYPHILIS COMPLICATING PREGNANCY*

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SINCE the establishment of our prenatal clinic in 1912, much consideration has been given to the subject of syphilis in pregnant women. At first very little was accomplished because our lack of laboratory facilities compelled us to rely solely upon the history and physical findings for diagnosis. Only rarely was it possible to obtain a history of the common symptoms of this complication. Physical examination likewise was of very little help and a positive diagnosis seldom was made except in those patients whose previous pregnancies ended in miscarriages or premature stillbirths.

Five years ago access to a Wassermann laboratory was obtained and the serological test of each patient was added to our routine. About 6 per cent of the applicants to our clinic showed a 3-plus or a 4-plus reaction. The addition of these facilities was a great aid in the cases that applied for care early in their pregnancies. As the majority of our patients came to us in the last trimester, satisfactory results were exceptional since insufficient funds forced us to depend upon mercury alone in the treatment of this condition.

In 1919 funds for the administration of salvarsan were obtained and it was possible to give our syphilitic patients intensive treatment. While the number of cases seen since the establishment of the free salvarsan clinic is small, the results have been so striking that your chairman has asked me to present them for your consideration. Thirty-two patients have been followed up after confinement. The accompanying Summary of Cases gives brief details of each case.

DIAGNOSIS

The history of symptoms and physical examination were of little service in making the diagnosis. Of the thirty-two patients only two gave the history of a rash. Two had sores on the vulva. One showed mucous patches and another had tabes. History of symptoms and physical examination aided in the diagnosis of only six, or 18.7 per cent of the total cases.

The history of the previous pregnancies was more valuable. Six-

teen, or 61.5 per cent, of the patients who had previous pregnancies, gave a history of miscarriages, stillbirths or living syphilitic infants and the characteristic tendency to carry each pregnancy further than the preceding ones was noted in seven. Eleven never had a miscarriage or stillbirth but always gave birth to living infants. After deducting from these eleven cases, three (8, 13, and 14) in which the diagnosis is open to question on account of its having been based solely upon Wassermann findings, there remain eight, or 34.7 per cent, of the multiparae who carried all of their pregnancies to viability and gave birth to living infants of whom the majority probably were syphilitic. This high percentage of living infants born to untreated syphilitic mothers emphasizes the importance of disregarding a negative previous pregnancy history. It also shows the value of the routine Wassermann as well as the need for a microscopic examination of every placenta for syphilis. If private patients object to the examination of their blood during pregnancy the placenta at least may be examined in order that these unsuspected cases of congenital syphilis may be recognized and treated early.

The routine Wassermann test has been of great assistance. In our earlier work a single test was made. Lately we have had all positive reactions checked in the same or a different laboratory. All of the cases included in this report gave a strongly positive reaction. The Wassermann during pregnancy at times has been confusing and in several instances patients who have had no treatment showed a 3-plus or a 4-plus reaction during pregnancy and a negative one after delivery. This experience has led me to be extremely careful in making a diagnosis upon Wassermann evidence alone. The seven cases marked with an asterisk in the accompanying Summary of Cases were diagnosed as syphilis solely upon Wassermann findings during pregnancy. Four of these occurred early in the series and as a result only one blood examination was made. The remaining three had repeated positive reactions. While it is possible that some of the seven patients were not syphilitic, it is probable that most of them were infected. My reason for including these questionable cases in this report is the fact that they introduce the question of the justifiability of intensive antisyphilitic treatment when the only evidence of syphilis is the presence of a positive Wassermann during pregnancy.

TREATMENT

The plan of treatment followed in this series consisted of the administration of salvarsan and mercury as soon as the diagnosis was made. Four decigrams of salvarsan and one mercury injection were given weekly for six weeks. In addition the mercury was continued for six weeks more. If after these six salvarsan and twelve mercury in-

jections the Wassermann test remained positive, a second similar
course was repeated. One hundred and fifty-one intravenous salvar-
san injections were given at various stages of pregnancy and in only
one case was it necessary to discontinue the use of this drug because of
unfavorable effects. The urine after treatment showed more than
the occasional trace of albumin which is found during pregnancy.
In those cases which were first seen too late in pregnancy to permit of
the use of a full course of the drug, a few injections during the latter
weeks were of great benefit. Following delivery, treatment was re-
sumed as soon as the patients were able to return to the clinic.

All infants were referred to the department of pediatrics immedi-
ately after delivery. They received daily mercury rubs for two
months. If the Wassermann test was negative one month later no
further treatment was given unless evidence of syphilis appeared.
The infants of the patients who had not been given sufficient prenatal
treatment and those in whom evidence of congenital syphilis was ob-
served were treated more intensively. In addition to the daily rubs,
0.5 c.c. of mercury oxycyanate was administered weekly for six weeks
at the end of which time intravenous salvarsan was commenced.

END RESULTS

In considering the end results I have divided the cases into three
groups according to the amount of salvarsan administered before
delivery. Group 1 contains four cases that received no salvarsan.

END RESULTS OF TREATMENT IN INFANTS OF 32 SYPHILITIC MOTHERS
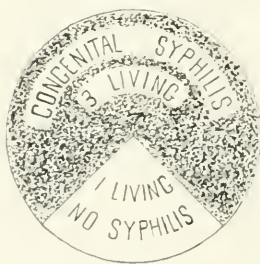
Fig. 1.—4 cases. No sal-
varsan before delivery.
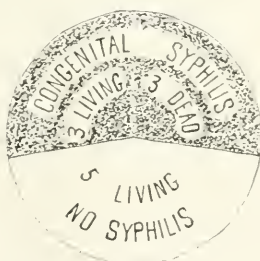
Fig. 2.—11 cases. 1-to-3
salvarsans before delivery.
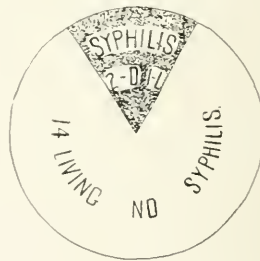
Fig. 3.—17 cases. 5+ sal-
varsans before delivery.

Group 2 consists of eleven cases that had from one to three injections
of this drug. Group 3 is made up of seventeen that had five or more
injections. A graphic representation of the results in each group is
shown in Figs. 1, 2, and 3.

No salvarsan was given in Cases 2, 18, 31 and 32. All of these gave
birth to living children. Two (2 and 31) had previous stillbirths and
the birth of living syphilitic infants in their cases was not unexpected.

Case 32 in all probability contracted syphilis after her previous child was born. According to tradition, the birth of a living child in this case is unusual. However, as 34.7 per cent of our syphilitic multiparae had living infants without previous miscarriages or stillbirths, we do not look upon this as a very uncommon course. At or soon after birth three of the four infants in this group showed signs of congenital syphilis. They have been under observation 4, $6\frac{1}{2}$ and 7 months, respectively, and have not responded to treatment as well as the syphilitic infants whose mothers had salvarsan before delivery. The fourth child has been observed for six months and has not revealed any of the stigmata of lues. Its mother's Wassermann was strongly positive before and after delivery. (See Fig. 1.)

One to three injections of salvarsan were given to eleven cases. Ten of these gave birth to living infants one of which died on the third day and another, a premature, died from pneumonia (?) two months after birth. Five of the remaining eight have been under observation $\frac{1}{2}$, 3, $4\frac{1}{2}$, 6 and 16 months and have never shown any evidence of syphilis. The other three of the living infants in this group had congenital syphilis. They did well under treatment and had negative Wassermanns at 11, 11, and 13 months. (See Fig. 2.)

Five or more injections of salvarsan were given in seventeen cases. Fifteen gave birth to living infants and two miscarried at the fifth month. Fourteen of these infants have never shown any evidence of syphilis. (They have been under observation 1, 1, 1, 2, 2, $4\frac{1}{2}$, 6, 6, 8, 10, 11, 12, 15 and 18 months.) The one syphilitic child in this group is doing well under treatment. (See Fig. 3.)

Fourteen living and apparently nonsyphilitic infants from seventeen syphilitic mothers is a result that could not have been obtained even under the best circumstances when we relied upon mercury alone in the treatment of this condition. Even in the last weeks of pregnancy, when insufficient time remained for the administration of a full course of salvarsan, a few injections of this drug proved beneficial and the pediatricians who followed our cases observed that the luetic infants born to mothers who had these small amounts of salvarsan before delivery responded more readily than usual to antisyphilitic treatment.

SUMMARY

The history and physical examination were of little value in making the diagnosis of syphilis. They aided in only six, or 18.7 per cent of the cases.

The history of the previous pregnancies was helpful in sixteen, or 61.5 per cent of the multiparae.

Eight unquestionably syphilitic multiparae carried all of their pre-

vious pregnancies to the period of viability and gave birth to living infants, 34.7 per cent.

This high percentage of living infants born to untreated syphilitic mothers emphasizes the need for the routine prenatal Wassermann and the microscopic examination of every placenta.

If private patients object to the Wassermann test the placenta at least may be examined in order that early treatment in latent cases may be inaugurated.

The routine Wassermann test is a most valuable aid to prenatal work. This test, however, at times is misleading, for a positive reaction during pregnancy occasionally becomes negative after delivery, even though no treatment has been given.

Salvarsan may be given at any stage of pregnancy and its value is indicated by these results.

Eleven cases that received one to three injections gave birth to five living nonsyphilitic infants and three infected ones that have done remarkably well under treatment.

Seventeen cases that received five or more injections were delivered of fourteen nonsyphilitic and one syphilitic infant and the infection in the latter has been easily controlled by treatment.

I wish to acknowledge my indebtedness to the Genitourinary and Pediatric Departments of the hospital for their splendid cooperation in the care of these patients.

SUMMARY OF CASES

CASE 1.—U. J., age twenty-three, black, one five-months' miscarriage, two premature deliveries at 7 and 7½ months, no symptoms or signs of syphilis other than pregnancy history. Wassermann 4+, repeated 4+. Six injections of salvarsan and seven of mercury before delivery. Wassermann, after delivery, negative. Six injections of salvarsan and five of mercury after delivery.

Child never showed any evidence of syphilis. Under observation 1½ years, at the end of which time its Wassermann was negative.

CASE 2.—M. S., age twenty-seven, white, two miscarriages at second and third months, one premature labor at 7½ months, one stillbirth. No symptoms or signs of syphilis, other then pregnancy history. Wassermann 4+, before delivery; no treatment. Child alive at birth; later developed a rash, a large spleen and suffered from inanition. At the end of six weeks its Wassermann was 4+. Intensive treatment given. Wassermann negative at the end of 5½ months. Last seen at the age of 6½ months, when it was doing well.

CASE 3.—M. H., age thirty-three, white, had three miscarriages and seven living infants. No symptoms or signs of syphilis. Wassermann 4+ before delivery. Six injections of salvarsan and five of mercury before delivery. Wassermann negative after delivery. Child born alive, and· has never shown any signs of syphilis. Its Wassermann at 5½ months was negative. This infant has been under observation 10 months.

CASE 4.—M. M., age twenty-nine, white, one previous living child. Wassermann 4+ before delivery. Repeated Wassermann 4+. Six injections of salvarsan and

of mercury before delivery. Wassermann positive, after delivery. Child alive at birth. Its Wassermann negative at sixth week. No evidence of syphilis developed during the six months it has been under observation.

CASE 5.—L. B., white, primipara. No symptoms or signs of syphilis. Wassermann 4+. Six salvarsan and mercury injections before delivery. Child alive and has shown no signs of syphilis during the 14 months that it has been under observation.

CASE 6.—C. S., twenty-six, white, one living child. History of rash. Wassermann 3+ before delivery. Repeated Wassermann 3+. Two salvarsan and three mercury injections before delivery. Wassermann 3+ after delivery. Four salvarsan and mercury injections after delivery. Child alive, no evidence of syphilis at any time. Wassermann negative at sixteen months.

CASE 7.—P. S., seventeen, white, primipara, a prostitute. No symptoms or signs of syphilis other than 4+ Wassermann. Five salvarsan and mercury injections before delivery; one salvarsan and twelve mercury injections after delivery. Child born alive and never showed any signs of syphilis. Age when last seen eight months.

CASE 8.—O. B., twenty-three, white, one living child, no symptoms or signs of syphilis other than 4+ Wassermann. Six salvarsan and nine mercury injections before delivery. Child born alive and never showed any evidence of syphilis. Last seen at the age of eleven months.

CASE 9.—E. M., age twenty-one, white, primipara, history of mucous patches, Wassermann 3+. Three salvarsan and two mercury injections before delivery. Five salvarsan and sixteen mercury injections after delivery. Premature child, 2200 grams, born alive but died at the age of two months in another hospital. Diagnosis. "Pneumonia."

CASE 10.—A. H., age thirty, white, two living, syphilitic children. No symptoms or signs of syphilis. Wassermann 3+, Repeat 3+. Six salvarsan and five mercury injections before delivery. Wassermann 2+, after delivery. Nineteen mercury injections after delivery. Child born alive and never showed any evidence of syphilis. Its Wassermann was negative at 15 months.

CASE 11.—A. B., thirty-four, white. One previous living child which died at three weeks. Wassermann 4+. Repeat 4+. No other evidence of syphilis. One salvarsan and two mercury injections before delivery. Wassermann 4+ after delivery. Five salvarsan and nineteen mercury injections after delivery. Child born alive, later developed rash, enlarged spleen and glands. Its Wassermann was negative at the age of 13 months.

CASE 12.—L. S., seventeen, white, primipara history of sore on vulva and prolonged sore throat. Wassermann 4+. Repeat Wassermann 4+. Twenty salvarsan and eighteen mercury injections before delivery. Wassermann 3+ after delivery. One salvarsan and nineteen mercury injections after delivery. Child born alive. Its Wassermann was negative at 3½ months. No evidence of syphilis was observed during the 4½ months it was under observation.

CASE 13.—E. W., twenty-nine, black, two living children. Wassermann 2+. Repeat 4+. No other evidence of syphilis. One salvarsan and one mercury injection before delivery. Five salvarsan and seven mercury injections after delivery. Child born alive, under observation 6 months. Never showed any signs of syphilis.

CASE 14.—M. F., thirty-four, white, one miscarriage 6½ months, condylomata of vulva. Wassermann 2+. Repeat 4+. One salvarsan and two mercury injections before delivery. Child born alive and developed rash, snuffles and glands. Under observation 11 months. Doing well.

CASE 15.—M. D., twenty-three, white, one 8-months' stillbirth, one living infant which died at the 6th week. Wassermann 4+. Repeat 4+. No other evidence of syphilis. Six salvarsan and nine mercury injections before delivery. Wassermann 3+ after delivery. Two mercury injections after delivery. Child born alive; later developed glands. Under observation 3 months. Doing well.

CASE 16.—E. T., twenty-one, black, one miscarriage, two stillbirths at 8 and 10 months. Wassermann 4+. Repeat 4+. No other evidence of syphilis. Three salvarsan and eight mercury injections before delivery. Wassermann 4+ after delivery. Six salvarsan and nine mercury injections after delivery. Premature child, 2300 grams, born alive. Wassermann 2+ at 2 months. Negative at 11 months. Under observation 19 months. Doing well.

CASE 17.—E. T., twenty-two, black, same as Case 16. Wassermann 1+. Six salvarsan and twenty-two mercury injections before delivery. Child born alive. Under observation 1 month. No evidence of syphilis.

CASE 18.—F. S., twenty-six, white, one living child. Wassermann 4+. Repeat 4+. No other evidence of syphilis. Two mercury injections before delivery. Wassermann 4+ after delivery. Child born alive. Never showed any signs of syphilis. Its Wassermann was negative at six months.

CASE 19.—A. M., thirty, black, primipara. Wassermann 4+. Repeat 3+. No other evidence of syphilis. Six salvarsan and fourteen mercury injections before delivery. Wassermann 4+ after delivery. Six mercury injections after delivery. Child born alive. No evidence of syphilis. Wassermann negative at 6 months.

CASE 20.—A. L., thirty-five, white, one 8-months' stillbirth. Four dead children. Four living syphilitic children. Wassermann 4+. Repeat 4+. No other evidence of syphilis. Two salvarsan and one mercury injection before delivery. Wassermann 4+ after delivery. Child born alive. Died on the third day. Syphilis.

CASE 21.—E. M., twenty-nine, white, one living *syphilitic* child. Wassermann 4+. Repeat 4+. Patient has tabes dorsalis. Eight salvarsan and seventeen mercury injections before delivery. Wassermann 4+, after delivery. Four salvarsan and three mercury injections after delivery. Child born alive. Under observation 2 months. No evidence of syphilis.

CASE 22.—K. C., thirty-four, white, one stillbirth and four living children. Wassermann 4+. Repeat 4+. No other evidence of syphilis. One salvarsan and two mercury injections before delivery. Child full term, born dead. Syphilis.

CASE 23.—T. S., thirty-two, white, seven living children. Wassermann 4+. Repeat 4+. No other evidence of syphilis. Three salvarsan and one mercury injections before delivery. Wassermann 4+ after delivery. Child born alive. Under observation 3 months. No evidence of syphilis.

CASE 24.—C. R., twenty-five, white, five living children. Wassermann 4+. Repeat 4+. No other evidence of syphilis. Six salvarsan and seventeen mercury injections before delivery. Wassermann negative after delivery. Child born alive. Under observation one month. No evidence of syphilis. Wassermann negative.

CASE 25.—M. M., twenty, black, two miscarriages. Wassermann 4+. Repeat 4+. No other evidence of syphilis. Six salvarsan and nine mercury injections before delivery. Wassermann 4+ after delivery. Child stillborn at the fifth month. Syphilis.

CASE 26.—G. P., twenty-six, white, two dead infants. Wassermann 4+. Repeat 4+. No other evidence of syphilis. One salvarsan and one mercury injection before delivery. Child born alive at term. Under observation 2 weeks. No evidence of syphilis.

CASE 27.—O. N., eighteen, white, primipara. Wassermann 4+. Repeat 4+. No other evidence of syphilis. Two salvarsan and two mercury injections before delivery. Five salvarsan and nine mercury injections after delivery. Child born alive. Wassermann negative for 4½ months. Under observation 4½ months. No evidence of syphilis.

CASE 28.—M. J., twenty-two, white, one living 8-months' premature child. Died on eighth day. Wassermann 4+. Repeat 3+. History of a rash. Ten salvarsan and three mercury injections before delivery. Wassermann 3+ after delivery. Child born alive. Under observation two months. No evidence of syphilis. Wassermann negative.

CASE 29.—S. S., twenty-one, white, one 8-months' premature infant which died. One full term living infant. Wassermann 2+. Repeat 4+. No other evidence of syphilis. Six salvarsan and seven mercury injections before delivery. Wassermann 4+ after delivery. Four injections of salvarsan after delivery. Child stillborn at the 5th month. Syphilis.

CASE 30.—L. R., thirty-two, white, one stillbirth. Wassermann 3+. Repeat 4+. No other evidence of syphilis. Sixteen salvarsan and fifteen mercury injections before delivery. Child born alive. Wassermann negative at 12 months. Under observation 12 months. No evidence of syphilis.

CASE 31.—V. F., twenty-eight, white, one stillbirth at 8 months. Wassermann 4+. Repeat 4+. No other evidence of syphilis. No treatment before delivery. Child born alive. Developed snuffles, enlarged spleen, liver, glands, etc. Under observation 4 months. Doing well.

CASE 32.—F. C., twenty-four, white, one living child. Wassermann 4+. No treatment before delivery. Child born alive. Wassermann 4+ at the 3rd month. Under observation 7 months. Epiphysitis of femur. Doing well.

20 LIVINGSTON STREET.

Society Transactions

(Continued from September issue)

DR. HIRAM N. VINEBERG, of New York, read a paper entitled **Vaginal Supracervical Hysterectomy with Interposition of the Cervical Stump for Cystocele and Procidentia Associated with Enlargement of the Uterus.** (For original article see page 368.)

DISCUSSION

DR. THOMAS J. WATKINS, CHICAGO, ILL.—Personally, I feel the term ''interposition'' is an unfortunate one, and prefer the term ''transposition'' of the uterus and bladder. It is a bladder operation. To specialists like Dr. Vineberg it makes no difference whether you call it interposition or transposition, but to others the term is misleading.

Dr. Vineberg did not tell us the size of ''the uterus that is too large.'' In our earlier cases we extended this operation in a research way, to determine how large a uterus could be successfully transposed. We transposed some that were too large. What happened? The fundus protruded and a wedge-shaped piece of the fundus had to be taken off later in some 4 or 5 cases. A uterus transposed that is too large never gives trouble afterwards because of remaining large. It always atrophies. The increased amount of atrophy may permit the fundus to protrude.

The most important feature in this paper is the question of infection. The dangers of infection vary with the amount of operative work done. One can transpose the uterus with very little danger of infection, but with excision of parts of the body of the uterus the danger of infection is much increased. The danger of infection is so much increased that if I have to excise the fundus and transpose the cervix, I usually make a supravaginal hysterectomy from above and transpose the cervix from below. The vagina is always a septic field, irrespective of cleansing and antiseptics. The wound remains in close contact with the septic area. It does not take any extensive bacteriologic investigation to prove this contention. Gauze left in the so-called sterilized vagina soon becomes offensive. Serum and blood after operation in contact with the vagina soon become infected.

The modified transposition operation of suture of a portion of the broad ligaments after excision of the anterior lip of the cervix, thus shortening and bringing the severed portion of the broad ligaments together and doubling the cervix upon itself, has given excellent results in selected cases. The uterus is thus left high in the pelvis supported by strong buttress. If supravaginal hysterectomy and amputation of the cervix is made *per vaginam* the entire mucosa of the cervix should be excised to save time and a possible stenosis.

DR. GEORGE GRAY WARD, JR., NEW YORK CITY.—This operation described by Dr. Vineberg is one that has interested me for some time. I have done it on

several occasions in past years without being aware as to who was the originator of the procedure, and I find it very satisfactory.

In looking up the literature of the subject I found that in 1909 Löwit and Rieck published (Monatschr. f. Geb. u. Gyn., xxx, 724) a report of an operation which, as far as I can see, has the same principle, and therefore I presume the credit for this procedure more or less belongs to them. They state in their report that the corpus uteri is removed and the cervix uteri sewed into the vesicovaginal septum to support the cystocele. That is the principle of the operation. In 1911 I understand Pfannenstiel, Cohn, and Franque also practiced this method. We all see cases with a large cystocele, with diseased cervix, and a uterus that is not suitable to leave or to interpose, and we occasionally see a uterus in such cases with a large growth which makes it difficult to do this operation through the vagina alone. In these cases we have been in the habit of doing an amputation of the cervix and separation of the bladder from below, with repair of the pelvic floor, and then opening the abdomen for the rest of the procedure, and my associate, Dr. Farrar has worked out a technic for this type of case which has proved very satisfactory and the results have been all one could desire as far as we have been able to follow them. A description of the technic will appear in the AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY.*

As to the matter of infection to which Dr. Watkins has referred, I think he is correct when he says that the amount of infection is proportionate to the amount of manipulation. That is practically true in all vaginal procedures that are extensive. We have been in the habit of using a rubber tissue drain inserted in the line of incision on the anterior vaginal wall, which is fastened to a piece of silk or linen, and is removed on the morning of the fifth day as a rule. I believe this has prevented the formation of a hematoma and possibly infection in many of these cases. We use it in the transposition operation or any procedure where there is extensive separation of the bladder from the anterior wall of the vagina.

DR. G. BROWN MILLER, WASHINGTON, D. C.—Those of us who do cystoscopic work in connection with gynecology will be interested in inquiring of Dr. Vineberg what percentage of his cases had bladder symptoms subsequent to this operation. I have had the opportunity to observe some cases in which the interposition operation has been done, not as Dr. Vineberg described it, but in which the whole uterus has been interposed between the bladder and anterior vaginal wall, and some of them have had marked bladder symptoms. In one case that had an intractable bladder condition I found a small fibroid tumor pushing up the under surface of the bladder which had developed since the operation was done. We know that some of the worst results from the Wertheim and similar operations, such as complete hysterectomy, in which the bladder has been traumatized by being separated from the uterus, have been due to infections of the bladder and as trauma of the bladder predisposes to this condition, as a rule, I believe that so far as we can, in our operations upon the vagina and uterus, we should inflict as little traumatism as possible. Dr. Vineberg's statistics include a number of infections and vesicovaginal fistulae, and I would be surprised if some of his cases did not have cystitis following operation and perhaps conditions of the bladder that took a considerable time to overcome if they were overcome at all.

DR. J. RIDDLE GOFFE, NEW YORK CITY.—About 25 years ago I revived interest in and called attention especially to the condition which the paper claims to relieve. Up to that time the Emmet operation was the only one in vogue, and having had failures from it, as we all had, I studied the situation and evolved an entirely original method. I do not need to go into detail before this Society

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*See page 403 of this issue.

in explaining the procedure. The one feature that was absolutely original was the removal of the uterus and the substitution of the broad ligaments as a basis of support by stitching them together across the pelvis. This relieves the situation and gives a plane of tissue for support that answers perfectly the condition we have when a small uterus is there. It therefore seems to me preferable to the modification just presented by Dr. Vineberg in cases of large septic uteri. But what I desire especially to direct attention to this morning is the fact that Dr. Charles Mayo has adopted this original procedure of mine, combined it with an equally original procedure of another member of our Society, Dr. Watkins, and with elaborate illustrations published it to the profession as an original procedure of his own. It is therefore becoming known among general surgeons as the "Mayo operation." This is indignity enough, but when we find members of our own Society announcing on the bulletins of their daily clinics the Mayo operation for procidentia, what can we say of their loyalty to their specialty and to their fellow members of this Society? When reproached for this injustice, the reply of one of our members has been, "Well, you know Mayo is a name to conjure with." Is it honest, is it fair to employ procedures invented, employed and published to the profession by our own members and apply to them the name of a general surgeon because for such "it is a name to conjure with," and may gain his approbation?

As I have remarked, Dr. Mayo gives credit to nobody for it, and yet there are two members of this Society who are responsible for the whole procedure. It should have the name of Watkins or Goffe, or both, rather than that of any other individual.

DR. JOHN A. McGLINN, PHILADELPHIA, PENNSYLVANIA.—The procedure outlined by Dr. Watkins and the one outlined by Dr. Goffe are sufficient to cure cystocele and prolapse of the uterus. I find in my work there are certain types of uteri which are not proper to interpose, and in these cases I do not see any reason why the operation should be complicated by leaving any part of the uterus to act as a dangerous point for infection or for possible malignancy, and I usually take out the uterus, which is much easier than to do a subtotal hysterectomy through the vagina and interpose the broad ligaments between the bladder and vagina. I do not refer to this operation as the Mayo operation.

Some years ago I saw Dr. Goffe do his operation, and one day I did the operation according to Dr. Goffe's technic long before the so-called Mayo operation was published. I placed my stitches in such a way that I found I did the operation which was eventually called the Mayo operation. I refer to the operation entirely in my work as Dr. Goffe's operation, because I think Dr. Goffe is the originator of it, but I have a slightly different way of doing the procedure from what Dr. Goffe advocated. Why we should leave behind a cervix which may undergone degeneration, which may give rise to an intractable leucorrhea, which may act as a point of infection, when total hysterectomy through the vagina is much easier than the other procedure, I do not know. This operation is sufficient to cure as I have had experience with it recently. A general surgeon not far from the city in which I live does not believe that the gynecologist should exist as such, and so far as obstetric cases are concerned, the only obstetric procedure which he does is a cesarean section done at variable periods during pregnancy. This gentleman attempted to cure a prolapse of the uterus recently by doing a total abdominal hysterectomy. He cured the prolapse of the uterus because there was no uterus left behind to prolapse, but nothing was done on the prolapsed vaginal wall, so that when the case came to me she had a total prolapse of the vagina. I resorted to the vaginal procedure, opening up and isolating what was left of the broad ligaments and suturing them together according to the method of Dr. Goffe, and then doing extensive

plastic work sufficient to cure the cystocele and rectocele. So long as this operation of complete hysterectomy by vagina with the technic evolved by Dr. Goffe is sufficient to bring about a cure, why complicate the operation by other procedures, by leaving behind a part of the uterus?

DR. ROBERT L. DICKINSON, Brooklyn, New York.—Having done between 40 and 50 Goffe operations for prolapse of the uterus before the Mayos did it, and having put a single suture through the broad ligaments as a modification of Goffe's operation, and published it long before the Mayos were using it, I desire to back up what Dr. Goffe has said. A single step in the so-called Mayo procedure is the very desirable provision of putting on four clamps, which brings within the reach of the surgeon the broad ligaments to suture more readily and possibly prevents slipping away of the upper ends of the broad ligaments which in unskillful hands might provoke secondary hemorrhage.

I also have tried the modifications spoken of by Dr. Vineberg, and it nearly doubles the length of the operation to leave in the cervix and have it perhaps infected at both ends. In other words, you can build up the broad ligaments amply and have a sufficient bridge with which to hold up the bladder.

Dr. Goffe has not spoken of one of the most important items in his operation, and that is, the front bridge of broad ligaments, or better the unrelaxed broad ligaments back of the top of such a bridge, which constitutes a nearly perfect support for even the worst forms of cystocele, and these worst forms of cystocele are those in which the bladder is torn from the pubic anchorages. You have therefore an excellent support. Suppose these broad ligaments are so flabby or relaxed that they pull down, so that you can suture them easily together and easily hang the bladder to them, nevertheless they retract, the weight of the uterus being removed, in an astonishing way. It goes without saying that we can build a very effective pelvic floor by utilizing these pelvic structures.

I would like to voice a protest against gynecologists for forgetting for so many years what Dr. Goffe did and advocated in putting this method before the profession. To Dr. Mayo I made the same protest.

DR. J. WESLEY BOVÉE, Washington, D. C.—I think we are apt in this work to forget the structures that are the real supporting ones in the pelvis. Dr. Goffe has called attention to that. There is still a possibility for failure even from this procedure when we think only of a part of the pelvic floor, namely, the broad ligaments. We also have supports coming from the sacrum which help to make up the great diaphragm of tissue which must be considered, or we may have the posterior margin of the broad ligament thus constricted pushed down along the vagina. We must hold it well back. Perhaps it ill becomes me to mention the structures running from the cervix back to the sacrum, which are necessary to keep this diaphragm of tissue in good condition. We might easily get the uterus to hang behind the broad ligament shelf unless we see it is attached well posteriorly either by strengthening the uterosacral ligaments by rebuilding them or triplicating them, or in some manner making normal tension on them.

DR. VINEBERG (closing).—I cannot quite understand the nicety of discrimination between interposition and transposition. After all, the uterus is put between the bladder and vaginal wall, and that is an interposition, and I do not see that there is much to be gained by using the term transposition.

As regards the size of the uterus, I would say that any uterus that is above the normal size,—and we should be familiar enough with what is the normal size,— that corresponds in size with the pregnant uterus of five or six weeks, is too large to be interposed. A uterus that has thick walls may not be found enlarged longitudinally, but it has been my experience that enlarged uteri that are interposed do

not atrophy. On the contrary, one of the things which made me turn to this operation was an experience I had of a patient in whom I interposed a uterus that was slightly enlarged, and later on the uterus became so large that I advised operation. The patient was so disgusted with me that she went to some one else and had an hysterectomy done.

The dangers of infection I think can be overcome. In all plastic work in the vagina a certain amount of suppuration will occur. I insert a piece of iodoform gauze at both angles in the anterior vaginal wound between the cervix and vaginal wall and remove it in about 48 hours. That stops the oozing, and also, if there is a collection of infectious material, permits drainage. I believe there is less danger of infection from below than above. If the case is taken in time and handled properly, even if there be an infection, and proper drainage be established, you will not get a fatality from it. I believe in my own case in which a fatality occurred that had proper drainage been instituted the patient would not have died. On the other hand, if you get an infection in a case operated upon from above, a peritonitis develops and your patient is practically beyond hope. The mortality is not any higher than the mortality of fibroids operated from above, which is at least 2 per cent in the best hands.

I have not made any claim of priority, and have given Löwit credit for his work, but I do claim there is an advantage in my method of fixing the stump of the cervix and of amputating the vaginal portion when it is lacerated or hypertrophied.

Bladder symptoms do occur in a certain number of cases whether you do the ordinary interposition operation, or whether you do this operation, but there have been no serious cases of bladder infection in my series. With a little treatment the bladder irritation will subside.

I am not prepared to enter into the merits of the Goffe operation over that of the Mayo operation. All I can say is that either is an excellent operation, but is indicated only in very elderly women. I heartily agree with Dr. Bovée that when you remove the cervix you remove a great deal of tissue that forms the pelvic support. There is a great deal of connective tissue around the cervix and cervical stump and the base of the broad ligaments which forms a support of great value. I must say that in the cases in which I have done total hysterectomy there was not the same good result, and I tried to follow both the Goffe and the Mayo methods. There is not the same support as there is when you get a good result from the operation such as I have described here this morning. There is a more firm and better support to the pelvic floor than there is when the whole uterus is removed.

Dr. Floyd E. Keene, of Philadelphia, read a paper on **The Interpretation of Vesical Symptoms in Gynecological Diagnosis.** (For original article see page 375.)

DISCUSSION

DR. JOHN O. POLAK, Brooklyn, New York.—I think this presentation of Dr. Keene's demonstrates how important it is to include cystoscopy in the department of gynecology and have it intimately related to the work of that department.

There is only one point I want to speak of in the discussion which Dr. Keene passed over casually, and that is the effect of parametrial inflammations on the urinary tract as the result of the contraction that takes place in the scar of a parametritic infection. In other words, a very large number of patients complaining of gynecologic symptoms give a history of the pain being referred to one side, and on urethral examination there is found to be a difference in the function of the two kidneys. The kidney on the side where the cicatrix is, even though the

stricture is not very pronounced, has a tendency to develop frequently intermittent pyelitic symptoms and the drainage is different on the two sides. With the relief of that we have not infrequently seen these symptoms disappear.

There is one question I would like to ask Dr. Keene, namely, does a marked retroflexion change the shape of the urethral orifice?

DR. BROOKE M. ANSPACH, PHILADELPHIA, PENNSYLVANIA.—I have seen some of the work of Dr. Keene and would emphasize the importance of cystoscopy in connection with gynecologic practice. In a large proportion of pelvic cases there are bladder symptoms, and I make a practice of obtaining a catheterized specimen of urine from every patient for urinalysis. This may seem to be a simple matter to the men of this Society, but in outside consultation practice, unless insisted upon, pains are not taken to obtain a catheterized specimen, and voided specimens being contaminated with leucorrheal or menstrual discharge may be more or less value-less.

Sometimes the pelvic condition is drawn to our attention first by vesical or kidney symptoms. I recall one case of fibroid tumor in which the symptoms resembled those of a stone in the bladder, and another fibroid tumor of which the first symptoms were a kidney crisis.

As to whether an acute retroflexion of the uterus alone can produce vesical symptoms, I am at some variance with the opinion expressed by Dr. Keene and believe it often does, and that the symptoms result from the pressure or traction of the displaced cervix upon the base of the bladder. Such symptoms are promptly relieved by restoring the uterus to a normal position.

It is not uncommon to get cases of cystitis and pyelitis associated with pelvic disorders in which the predisposing cause is a stasis of urine from distorsion of or pressure upon the ureters or bladder. A colon bacillus infection takes place secondarily. Very slight pressure on the ureter is sufficient to cause stasis of the urine in the ureter. The secondary infection will usually rapidly disappear as soon as the basic lesion is relieved, and sometimes no more treatment of the ureter is needed than simply the passage of a catheter.

DR. ROBERT L. DICKINSON, BROOKLYN, N. Y.—The cystoscope can be used by the gynecologist as part of his routine examination in every case that has an irritable bladder or bladder symptoms, using preferably the small Broedel instrument. It causes very little or no pain to the woman and one gets a good view of the bladder base with it and can determine whether or not further measures are necessary.

As to the frequency of urethritis of mild type in women with congested bladder base, one gets very good results from using a gloved stretcher dilator, not the ordinary dilator, because the meatus is smaller than the rest of the urethra, but of the type I have mentioned. This with simple applications to the bladder base, gives us in the important cases Dr. Keene described this morning a very large number of cures and the relief is out of all proportion to the amount of work we have to do. There is no use in sending such cases to the cystoscopist if that simple treatment relieves them.

DR. ARTHUR H. CURTIS, CHICAGO, ILLINOIS.—I have been impressed with the fact that after operations one of the most frequent troubles we have is the retention of urine. I would like to ask Dr. Keene how frequently he has encountered this trouble, and what his measures are for relief; whether he catheterizes once or several times, and if he does catheterize, does he continue to do so until residual urine disappears.

DR. EDWARD H. RICHARDSON, BALTIMORE, MARYLAND.—Urology in women is an integral part of gynecology, as well as is general abdominal surgery. These

three branches of surgery belong together and are inseparable, and Dr. Keene's slides and his paper illustrate forcibly how frequently they are associated. Any one who attempts to practice gynecology without the use of the cystoscope as a routine procedure is going to miss perhaps the most interesting group of cases which present themselves with pelvic lesions.

I agree with Dr. Keene in his statement that uncomplicated retrodisplacement of the uterus is not an important factor in the production of vesical symptoms.

One type of case which Dr. Keene mentioned, so far as my experience goes, is unique, and that is the case presenting a large fibroid associated with hematuria in which was found a condition approaching a papillomatous growth over the dome of the tumor in the bladder. I would like to ask Dr. Keene whether he made a microscopic section of that particular portion of the tumor which was protruding into the bladder, and if so, whether or not it turned out to be an adenomyoma. We know of the invasive character of adenomyoma and that clinically at least it is a malignant tumor. The association of hematuria from the mere pressure upon the bladder of the fibroid tumor is certainly an exceptionally rare occurrence. It suggests strongly, therefore, that this tumor may have been an adenomyoma with actual invasion of the bladder wall by the growth, and that the papillomatous appearance on the bladder wall, if examined microscopically, might have shown endometrial elements.

DR. GEORGE GRAY WARD, JR., New York City.—Since Dr. Curtis made his valuable contribution on retention of urine after operation, I have been in the habit of making it a routine in my division in the Woman's Hospital in all the extensive bladder operations, to catheterize at once after the patient voids until the bladder demonstrates that it can completely empty itself. There is no question in my mind from the experience we have had that this is one of the ways of avoiding postoperative trigonitis, which is I think more common with these patients than one realizes. I simply wish to emphasize the great value of this prophylactic measure.

DR. HENRY T. BYFORD, Chicago, Illinois.—Ordinary retroversion, without other complications than relaxation of the posterior supports, seldom causes symptoms. When there are symptoms there is usually more or less prolapse with relaxation of the connective tissue anteriorly, or some other pathologic condition in the pelvis.

DR. KEENE, (closing).—Dr. Polak has brought up an important point, namely, the incidence of partial strictures of the lower portion of the ureter in cases of old parametritis. I think that is a point one should investigate in distinguishing left sided symptoms in patients that have been operated upon as well as in cases of chronic infection. In these cases the symptoms, especially those of blockage, are usually associated with the menstrual period. As a rule, the symptoms are premenstrual in type occurring during the height of premenstrual congestion and are due to a partial occlusion of the terminal portion of the ureter. One observer has drawn attention to what he calls renal dysmenorrhea in which the pain is always lateral, due to the fact that there is a partial obstruction of the ureter giving rise to renal colic.

With reference to the remarks of Dr. Anspach as to the question of obstruction associated with an uncomplicated retroflexion, my experience has been that such does not occur.

With regard to the question of Dr. Curtis, we follow his technic in our service. These cases are catheterized as he has recommended and we find it of the greatest value.

Dr. Dickinson brought out the point of the ease with which patients can be examined by using a very small cystoscope, for it means nothing more than passing

a catheter, so far as discomfort of the patient is concerned. It takes three minutes, and one determines definitely the nature of the underlying pathology. This fact of dilating the urethra is of enormous value. We meet so often cases at or about the time of the menopause of what we call the climacteric bladder in whom there are marked symptoms; one finds a normal urine, a little edema, with perhaps small cystic formations in the trigone, changes so small as to be out of all proportion to the severity of the symptoms which are presented. In such cases remarkable relief often follows the examination and complete relief may be obtained by repeated urethral dilatations.

In answer to Dr. Richardson's question regarding the nature of the tumor, it was not an adenomyoma extending to the bladder. I quite agree that hematuria in association with a benign tumor of the uterus is most unusual, but in this case I am quite sure that such did occur for the bleeding ceased immediately after operation and did not recur.

DR. EDWARD REYNOLDS AND DR. DONALD MACOMBER, of Boston, read by invitation, a paper entitled **Certain Dietary Factors in the Causation of Sterility in Rats—With Special Reference to the Histology.** (For original article see page 379.)

DISCUSSION

DR. EDWARD REYNOLDS, BOSTON.—We perhaps ought to say in self-defense that the numbers of matings which we have made are much larger than we have put on paper.

I would like to speak of one point which there was not sufficient time to bring out in the paper. Abortion with macerated fetus is apparently unknown in rats. We could find no mention of it in the extensive literature of rat laboratories, and Dr. Castle has never seen an instance. We had 8 cases of abortion with macerated fetuses in our small number of matings on deficient diets. We have seen many instances in the human race of defective and scanty spermatozoa in man whose diet was analyzed and found to be defective. Most of them have improved and some of them have returned to normal with correction of the diet. We have seen one instance in a woman of whose history we have an abstract report. She was a well nourished young woman of the well fed class. She kept a chef and maintained an ample table. She had had five successive abortions. We could find no cause for them. It seemed absurd to analyze her diet, but an analysis showed that during the years in which she had had these five successive abortions she had selected from the abundance of her table a diet which contained practically no calcium. At this point she became pregnant a sixth time. She was at once put on medicinal doses of carbonate of calcium; her diet was altered to one that contained an abundance of calcium, and in a little while medicinal calcium was stopped. The diet was continued and she went to term and bore a fine child.

A single case proves nothing, but in connection with rat work and work on cattle and swine it is known that a deficiency in calcium causes abortion. This is suggestive and well worth considering.

I would like to say also, we have not had time to introduce war statistics, but we have received statistics of the present birth rate in the central countries, notably in Austria, which show in spite of an increase in the marriage rate since the war the birth rate has fallen off, in Austria from 18 to 12 per cent.

DR. W. BLAIR BELL, LIVERPOOL, ENGLAND (by invitation).—I would like to express my high appreciation of this very valuable and important scientific paper.

Furthermore, I should like to express my approbation of the judicious caution with which the conclusions have been drawn. I think Dr. Reynolds and Dr. Macomber have put the least possible construction on the practical issues arising from their work.

I dare say, many of you know that for fifteen years I have been very much interested in the calcium metabolism. It is exactly fifteen years ago since I published my first paper on the subject, and in that paper I drew attention to the extreme importance of calcium metabolism in regard to the reproductive functions.

First of all, I would call attention to what probably every one knows, namely, that a hen will only lay eggs when it is well supplied with calcareous material. I therefore investigated hens in my laboratory and by devising a method for estimating the calcium in the blood, I was able accurately to say when the hens had laid eggs, and when they had not laid eggs, and I could predict their functional ability. Those experiments of course, led me to examine women, and I found in them changes in the blood which were indicative of the relationship of the calcium metabolism and reproductive functional activity. Menstruation was found to be almost entirely dependent upon the calcium metabolism; that is to say, I found suggestive changes in the calcium content of the blood of women before, during, and after menstruation. Moreover women who suffered with amenorrhea owing to calcium deficiency could be made to menstruate by the administration of calcium lactate in therapeutic doses.

I also found many years ago just as Dr. Reynolds has found, that calcium lactate will prevent habitual abortion.

With regard to the results obtained by Dr. Reynolds and Dr. Macomber with protein deficiency in the diet, it seems to me, that a low protein diet is not of the same importance in this connection as the calcium deficiency. Protein, of course, is very obviously necessary for every function of the human body, and it forms such a large part of the human body that one looks upon a low protein diet as producing a general insufficiency.

I think that these experiments which have been detailed by Dr. Reynolds and Dr. Macomber show that a low calcium content in the diet is the specific factor in causing sterility.

DR. EDWARD P. DAVIS, PHILADELPHIA, PENNSYLVANIA.—I can only revert to published analyses of the blood of pregnant women showing its calcium content, and that these analyses show amply that the various disabilities of reproduction in pregnancy are accompanied by enormous variations in calcium content. My own observation and studies have been along the line of toxemia in which these variations have been exceedingly common, and a study of fertility may throw important light on the vexed problem of toxemia.

DR. MACOMBER, (closing).—I think it might be of interest to enumerate a few of the foods that are rich in calcium. Milk is the chief supply in the human diet, and an ample amount of milk, if taken, will counteract any question of deficiency. Green vegetables also contain moderate amounts, but milk is the chief source.

As Dr. Bell has brought out, medicinal calcium is either calcium carbonate or calcium lactate, which is a very valuable thing to use clinically, and as Dr. Reynolds has said we have had some success with it.

As to low protein in the food, I think it is demonstrated by our experiments that low protein alone, as Dr. Bell remarked, is not as important as low calcium, but when combined with low calcium it increased the bad effect of the low calcium. That is something that is rather universally appreciated by animal breeders as a whole because they make their diet for breeding animals high in protein.

Dr. Reuben Peterson and Dr. William J. Butler, of Ann Arbor, presented a paper on **Pneumoperitoneum and Roentgenography as Aids to More Accurate Obstetric and Gynecologic Diagnosis.** (For original article see page 349.) (This paper in the absence of the authors was read by Dr. M. D. Haag of Ann Arbor.)

DISCUSSION

DR. I. C. RUBIN, New York City.—I regret Dr. Peterson is not able to be here, because I wanted to learn from him a number of points that have been troubling me since I have done this work. So far, the total number of cases I examined by transuterine insufflation of oxygen and carbon dioxide is 326. In this series there were 192 that proved patent the first time. In 95 cases nonpatency was the result. In 25 cases the test was repeated once. In five cases the test was done three times. In one case it was done six times. In 8 cases the result was doubtful the first time and no later examination was carried out to corroborate the finding or to amplify it.

The cases that were chosen were those that were sterile either absolutely or those that had had one child or one pregnancy, that is a miscarriage. In most of these cases of miscarriage there was a history of intentional induction of abortion very shortly after marriage. These form a rather sad group of the sterile cases. In a great number of that group nonpatency was the result. I also used insufflation in a number of cases that had had operations for the relief of sterility or for other gynecologic conditions, but in which sterility was one of the features. For instance, there were a number of patients upon whom a Dudley or Pozzi operation or simple dilatation was performed. In others a stem pessary had been inserted. There were also a number of patients who had had ectopic pregnancy and upon whom a unilateral salpingectomy was performed. One patient had had a bilateral salpingectomy for repeated ectopic. There was a small group of patients who had had disease of the adnexa and a laparotomy with ablation of both tubes, who were nevertheless still hopeful that they might become pregnant and who displayed an intense desire for future pregnancy.

The usefulness of this method was evident in cases where we had done therapeutic sterilization by ligating the tubes. There were a number of such cases in which it was important to learn whether the ligation was successful, or whether at least one of the tubes or the stumps had become patent. There was a small group of cases in which myomectomy was done as a conservative measure in preference to a hysterectomy because of absolute sterility, the hope still remaining that the patient might become pregnant. Where a number of tumors was removed from the uterus, particularly when one of these was of the submucous variety, it was rather interesting to determine whether in one or two places the sutured bed after enucleation might not have included the uterine ostium or the intramural portion of the tube. Then there was a small group of cases upon whom we had done plastic operations on the tubes, ''conservative surgery'' cases, which had had bilateral salpingostomy for bilateral hydrosalpinx or where the plastic operation was performed upon one tube in young women in whom we still wished to conserve the function of pregnancy. There were three cases in that group, and in one case only was patency proved. The other tubes proved nonpatent as it was impossible to get the gas through them to establish a subphrenic pneumoperitoneum.

I have not used the method for abdominal inflation except in a few instances. For the purpose of general abdominal diagnosis, I am using 1000 c.c., a little more or less. I do not believe that it is dangerous to do it for this purpose. I believe the peritoneum takes up gas rapidly when one uses carbon dioxide, and Dr.

Peterson has amplified the method admirably and has come to the same conclusion. His patients have not suffered any untoward symptoms immediately, neither were there any sequelae.

My object primarily was to find a method whereby one could determine without operation, if possible, the fact of patency of the tubes, for I have had, as most of us have had, some disappointing experiences in cases that I had operated for sterility by one method or another, and in patients in whom the physical findings before the operation were absolutely negative. Undoubtedly many of these failures were due to nonpatent tubes that had escaped detection.

The points that have interested me particularly in developing the method in the last 150 cases, I am going to refer to briefly, and by the way, I have used carbon dioxide exclusively since it was first suggested. I use very small quantities of the gas, only 100 or 150 c.c., practically a cupful, which rises immediately after insufflation to the diaphragm, lifting it up slightly, as evidenced on fluoroscopic examination. The reaction of this subphrenic pneumoperitoneum varies with individuals. As a rule, the symptoms caused by the insufflation or the subphrenic pneumoperitoneum are very mild, and they result in a little sticking pain in either shoulder or both. These pains are pathognomonic; they are so constant when we use 100 c.c. of carbon dioxide that without resorting to the fluoroscope we may say that the gas went through the tubes as evidenced by these pains. Patients, as we all know, react differently, however, to pain stimuli, and therefore occasionally one can slip up if he depends upon that symptom alone, because some patients are apt to say they have strained themselves on the examining table and have pains in their shoulders. Therefore, I have practically combined the use of the fluoroscope with the insufflation in every case. It is a simple matter.

I have done most of these cases in the office or in the dispensary, or in the x-ray department of the hospital, and most of the cases have been ambulatory.

One point I would like to emphasize in closing is this: if the method is to be of any permanent value it should be along these lines. In the apparatus I have employed, the gas is allowed to displace 40 c.c. of water through the siphon cylinder at the rate of 15 second's time, to raise the mercury column to 100 m.m. This I find is the most desirable rate of pressure flow. When the pressure reaches 80 before the initial drop, I have found so far that the tubes are normally patent. When the pressure of this rate of flow reaches 200 millimeters, the tubes are probably occluded, but at another time with a different pressure rate of flow, say 20 seconds to 100 mm. Hg. or 30 seconds to 100 mm. Hg., we may show the tubes are patent. In other words, the gas may go through at another time under different pressure conditions. When this pressure rises to 140 or 160 before a drop is noticed in the mercury column, there is probably stenosis in either one or both tubes. Occasionally in a nonpatent case, that is, where the pressure is high, we are ready to conclude that the patient has occluded tubes, but on second examination we will find the gas goes through. Therefore, I have adopted the rule not to say a patient is sterile on account of nonpatent tubes unless the findings are uniformly the same by three examinations. The important thing in the further development of the method is the behavior of the carbon dioxide insufflation in cases on which we are going to operate, where the abdomen has to be opened for one or another indication, and to note what happens under the eye by noting the pressure phenomena. After we have had a larger series of cases, we may be able by the present method to predict without doing laparotomy whether we are dealing (1) with normal patency of the tubes, (2) with a relative stenosis in one or both tubes, or (3) whether we are dealing with complete occlusion. The great contribution Dr. Peterson has made in the matter of tubal patency is where there has been a little increase in pressure he introduces enough of the gas so that he can

get a picture of the pelvis and of the pelvic organs, and so can determine which tube is at fault.

DR. GEORGE GRAY WARD, JR., NEW YORK CITY.—I was stimulated to try out this very interesting procedure when Dr. Peterson came to New York and presented a paper before the Sloane Alumni Society. I sent one of my house officers to Dr. Rubin to obtain the necessary information as to the technic and the apparatus, which he kindly furnished us. We have tested the method with those cases that seemed suitable for it, and the results we have obtained so far in the Woman's Hospital are as follows:

GAS INSUFFLATION OF TUBES

Twenty-two (22) patients complaining of sterility have been examined. Carbon dioxide gas has been used in eighteen (18) cases and oxygen in four (4) cases. One (1) patient has been reexamined after an interval of one month. Only two (2) cases have been examined at operation following insufflation. No conclusions can be drawn from so few cases but the following observations have been made.

CLASSIFICATION OF CASES

The standards of pressure which Rubin has adopted to judge the condition of the tubes have been used to classify the cases examined. All cases examined in which the level of pressure has not risen to 150 m.m. with a rate of flow of the gas of 20-100 have been classified as patent. Cases in which the level of pressure has risen to or above 150 m.m. but has fallen before reaching 250 m.m. have been classified as partially occluded. A rise in pressure to 250 m.m. has been considered to indicate absolute occlusion of the tubes.

Using this classification the results have been as follows: patent, 14; partially occluded, 4; totally occluded, 4; total, 22.

CONFIRMATORY TESTS

Fluoroscopic Examination.—The determination of patency or occlusion of the tubes as indicated by pressure readings has been checked in all cases by an examination with the fluoroscope. Gas under the diaphragm has been easily observed in all cases believed to be patent or partially occluded, that is, whenever gas appeared to enter the abdomen as judged by pressure readings.

Right Shoulder Pain.—Right shoulder pain has proved to be a very common symptom. It has been present in fifteen (15) of the eighteen (18) cases in which gas has entered the abdominal cavity as soon as the patient has assumed the erect posture. This sign has been so common and so indicative of the presence of gas in the abdominal cavity that as Rubin pointed out fluoroscopic examination has been almost unnecessary when it has been present. This is of practical value from a clinical standpoint when a fluoroscopic examination cannot easily be obtained.

SUBJECTIVE SYMPTOMS

Insufflation has been accompanied by considerable discomfort for a short period of time in a number of the cases. Patients have complained of pain which is caused by the following: 1. Picking up the cervix with bullet forceps. 2. Passage of the cannula through a tight cervical canal. 3. Downward traction on the cervix. 4. Distention of the uterus when the tubes are occluded causing cramplike pains in the lower abdomen. 5. Reflex pain from the diaphragm in the right shoulder.

The right shoulder pain has been most severe, varying from slight discomfort to pain so severe that it was accompanied by nausea in five (5) cases and faintness in three (3) cases as soon as the patient sat up.

No alarming symptoms have occurred in any case.

It has apparently been very difficult for many of the patients to come to the

hospital complaining of sterility when they had no other symptoms. Many of the patients are very apprehensive, and fear examination on account of the pain which it may cause. Many of the unpleasant symptoms can be avoided by going about the examination in a quiet way and reassuring the patient. After examination the patients have invariably soon forgotten all discomfort and have been very grateful to feel that an examination has been made which promises to give some definite information about their condition.

CARBON DIOXIDE VERSUS OXYGEN

Four (4) patients have been insufflated with oxygen. Two had occluded tubes and two were patent. One of the patent cases had no symptoms, the other was neurotic. She complained of pain and discomfort for three days following insufflation.

With carbon dioxide gas considerable discomfort has occurred in several of the cases. However, symptoms have never lasted longer than one-half hour. Carbon dioxide has been used for this reason and also because facilities were such that an immediate examination could be made with the fluoroscope.

VOLUME OF GAS

The volume of gas introduced has never exceeded 480 c.c. The average amount used has been from 240 to 280 c.c. The volume used has proved to have very little to do with the symptoms produced. Carbon dioxide is absorbed so rapidly that symptoms have readily disappeared, although a relatively large amount of gas has been used. This is important when an obese patient is to be insufflated since examination with the fluoroscope is difficult.

VALUE OF METHOD FOR PRODUCTION OF A PNEUMOPERITONEUM

Unless it is important at the time of examination to know also whether the tubes are patent, this method has not seemed practical for the production of a pneumoperitoneum. With the use of local anesthesia, gas has been introduced by needle through the abdominal wall with comparatively much less discomfort to the patient.

OBSERVATIONS IN INDIVIDUAL CASES

CASE 1.—The uterus was very small and sensitive to pain. Cramplike pains were so severe that the pressure could not be raised to 250 m.m. with either trial.

CASE 3.—This case was given a second trial after an interval of one month. The findings were the same at the second examination.

CASES 5, 7 and 18 give histories like that of ovarian hypofunction. The low level of pressure is interesting.

CASE 8. Here a high level of pressure was needed for penetration. The possibility of breaking down adhesions at the end of the tube would be an interesting interpretation of the findings.

CASE 10 is the record of a case which showed congenital occlusion of the tubes at operation.

CASE 11 is a case in which chronic bilateral salpingitis had been diagnosed in the clinic and in the house. Examination showed the tubes to be patent. Inspection at operation showed the tubes normal.

CASE 12 shows how a false interpretation could arise if the cannula was in a long tight cervix instead of the uterus during insufflation.

CASE 14 shows tubes patent. A preoperative diagnosis of left adnexal disease had been made. At operation the adnexae were found normal.

CASES 15 and 16 showed two occluded cases in each of which the bimanual examination was negative.

CASE 17 was a case in which a ''right salpingectomy and a resection of the left tube and ovary'' had been done three years previously. Gas passed into the abdomen.

CASE 21 showed a rather low level of pressure. A diagnosis of retroversion and adnexitis had been made in the clinic. Much involvement of the tubes seems doubtful.

In closing, I wish to say that I consider Dr. Rubin has made a very valuable contribution to our methods of diagnosis, and I cannot see how we can have any woman coming to us for sterility, where we have checked up the husband, without previously trying out this method to prove the tubes are patent before we subject her to various operative procedures either on the cervix or via the abdomen.

DR. EDWARD REYNOLDS, BOSTON, MASSACHUSETTS.—When gentlemen have done hard work and a great amount of it in developing a new method, it is always ungracious to present even in the most moderate way opposite views, and it is ungracious when one's personal experience is very limited as compared with the work the gentlemen have shown here.

My experience is limited to a demonstration of three cases by Dr. Rubin, and I speak as a spectator of this method. I believe the method is demonstrated to be reasonably safe. I believe it is feasible, and that the evidence produced is probably in most cases valuable and reasonably dependable. However, I do not think it is a simple method. It demands special training and good training of assistants, and a good deal of training for the operator, so to speak. It involves a large amount of apparatus and care. Even after the training I cannot believe that it is an easy or simple matter for the patient. My impression was the patients suffered a great deal of pain, and that they were considerably prostrated afterward temporarily. I believe it to be a method of value and worthy of further exploitation. I feel it is not a method to which I should personally wish to subject a woman in whom I was interested unless I thought it would furnish evidence of distinct value to her interest. I think there is a very limited class of cases in which this evidence is necessary.

I protest against its use from my present knowledge as a routine procedure in cases of sterility. I think if a man has trained himself to accurate examination of the secretions of the genital tract in a woman he can obtain in most cases specimens which he has a fair right to believe are obtained from the body of the uterus and very near the fundus, specimens that are not contaminated, and also from the confirmatory evidence of the microscope that show there is no essential contamination. If you have spermatozoa at the fundus of the uterus in postcoital examination, and examine the secretion microscopically, you may feel sure that the tubes are not closed. I speak from a large experience in such examinations and no small experience in checking them by abdominal incision. A closed tube is always a tube with an amount of secretion in it. That secretion drains into the uterus and I believe it kills the spermatozoa almost always. If it has been diluted by much more abundant secretions of the uterus and cervix, you will find the spermatozoa within the cervix. If they penetrate to the fundus they are dead. It is usual, if not always, that they come in contact with concentrated tubal secretion which has killed them and you probably have closed tubes. If you have spermatozoa living at the fundus you may be sure the tubes are not closed.

I have recently seen a case in which the tubes were occluded near the cornu, with spermatozoa living at the fundus and tubes closed. With both methods we are liable to make mistakes. Both have their limitations of usefulness and I would not make a routine examination like that proposed.

DR. ROBERT L. DICKINSON, BROOKLYN, NEW YORK.— I would like to report 77 tests of patency of the tubes, 3 of them in Dr. Rubin's office.

In answer to the last speaker (Dr. Reynolds) the method has proved simple without a number of assistants. The first patient was a highly neurotic, badly frightened woman, pallid, and almost scared to death as she lay on the table. She had purple

lips and some shock. In half an hour or three-quarters of an hour she was all right. She was a woman who suffered pain and was shocked. She was as bad a subject as you could find for intrauterine manipulation.

The other two suffered no more discomfort than you would find from introducing a uterine sound into a nonsensitive uterus. There was no pallor, no disturbance. In all three cases it was perfectly simple and easy to see the beautiful bow under the diaphragm through the fluoroscope under the gas as it moved. Objection has been raised that the Rubin test involved considerable apparatus and a number of assistants. That is not true. In using fluid for injection, not more than 10 minims enter, and if there is resistance you begin with eight minims, and in four or five minutes more the tubes are open. The maximum amount I have injected is 10 minims. The reaction is more than with gas. One-third of the patients have discomfort two or three hours later. I have had one marked reaction in a patient who had to go to bed, and one other who had considerable discomfort.

I do not believe a test like this, as Dr. Reynolds has said, is for the nonexpert. These tests must be worked out and tried and the cases must be very carefully selected. We have proved that this test can be carried out, and above all things we think there can be no longer any excuse for operating for sterility without resorting to the test to determine tubal patency.

DR. EDWARD H. RICHARDSON, BALTIMORE, MARYLAND.—I wish to say a few words in regard to this method. Through the courtesy of Dr. Rubin I saw this method demonstrated at the Mt. Sinai Hospital Dispensary, and my impressions were decidedly different from those of Dr. Reynolds. I talked with the patients after insufflation was completed, and I questioned them personally to find out whether they had much discomfort. They were standing up and would walk down to the fluoroscopic room and leave the hospital apparently with no more discomfort than a slight sensation in the shoulder. None of them showed any reaction, and I must say I think this is one of the most important contributions that has been made to the study of sterility within recent years.

I was much interested when Dr. Rubin's first paper came out, but I was skeptical about the safety of it. But we have had reported today from the Ann Arbor Clinic and from Dr. Rubin's clinic over 500 cases in which this method has been tried, and the testimony of these gentlemen is that there has been no serious result. I immediately obtained the apparatus and had it taken to Baltimore, and I tested it out on my first case just before I came to this meeting. It did not require any particular skill; it did not require a good deal of assistance, but it is simply a matter of carrying out the technic, and my experience in this one case leads me to believe that this method will come into general use in properly selected cases, and I think its safety has already been demonstrated.

DR. JOSEPH L. BAER, CHICAGO, ILLINOIS.—May I offer a word or two in defense of the simplicity of the method? I had the opportunity of talking with Dr. Rubin in Chicago last summer when the American Gynecological Society met there, and following that meeting I began using the procedure without having the benefit of seeing Dr. Rubin or others more expert than myself do the work. I am doing it entirely in dispensary surroundings and have only a nursing assistant. I have found it entirely feasible to carry out the test without any further aid.

The pain following the use of oxygen was easily controlled by a single dose of 5 grains of aspirin, and in no case has any shock resulted.

I should like to know if there is a distinct advantage in the use of the Sims position as against the dorsal position for the transuterine gas introduction. I have been using the dorsal position.

DR. HAAG, ANN ARBOR, MICHIGAN (closing).—With reference to what Dr. Rubin said about determining the patency of the tubes, we have made it a routine in cases where the rise of pressure has been very great, say up around 200 m.m. of mercury, to make at least four or five trials. We have found in our initial attempt to introduce gas into the tubes that it did not result in the gas passing through into the peritoneal cavity, but on the fourth attempt it passed through it at a relatively low pressure. In most cases we have used the transuterine or transperitoneal method and checked up the findings by operation.

I want to explain that some of the cases are labeled pyosalpinx, cystic ovary, and so forth, because they were diagnosed that way in the first diagnosis but checked up at operation and gone over carefully and labeled afterwards.

It is also interesting to know that the Department of Medicine and the Department of General Surgery of the University of Michigan were very much antagonistic to the method at first. Now, they are bringing their obscure cases over and asking us to inflate the patients, and we have been able to make some diagnoses for them. We have one case of mesenteric cyst in which an absolute diagnosis was made by the transperitoneal method before operation.

One interesting thing we have noticed is the fact that obstruction a great many times occurs in the interstitial portion of the tube and not at the fimbriated extremity.

As regards the use of oxygen and carbon dioxide, if it is necessary to make an injection in the office and send the patient to a roentgenologist, oxygen is preferable because if there is any lapse of time between the injection and the fluoroscopic examination, you may miss your picture if you use carbon dioxide.

We are now making our own exposures, taking all exposures in stereo, so that we can become deft in examining the x-ray plates. One can get along very nicely without much assistance after he has once learned the method.

We have been using the method more or less routinely, not for the purpose of drawing definite conclusions but to get a large series of cases so that the members of the profession can tell whether they wish to adopt the procedure or not.

DR. RICHARDSON.—Is not this test carried out for the deliberate purpose of determining the patency of the tubes?

DR. HAAG.—We have only one case in which the abdomen was opened and we had the tubes directly in sight in which the fimbriated extremities were sealed. There was a small opening through one tube. I cannot tell the exact number of millimeters, but it is some where around 220. We would not get above 200 millimeters unless we could watch the tube. In that case the tube was forced open under 220 millimeters of mercury, but was under our direct sight where we could see what was going on. The fimbriated end was folded in and was sealed off.

As regards the question of Dr. Baer's, concerning the efficacy of the Sims or dorsal position, that is a personal matter. We tried the dorsal position first and tried the Sims position, and we found we could expose the cervix much more easily in the Sims position than in the dorsal position. That makes no particular difference as long as you get it done, but we like the Sims position better than the dorsal position.

We have not attempted to draw any conclusions. However, I do think from what we have seen in the clinic, there is one part of this procedure that will be used quite extensively, and that is the injection of gas through the uterus to determine the patency of the tubes.

THE NEW YORK OBSTETRICAL SOCIETY
MEETING OF APRIL 12, 1921

THE PRESIDENT. DR. FRANK R. OASTLER IN THE CHAIR

DR. WILLIAM H. CARY, of Brooklyn, N. Y., read a paper entitled **Sterility Studies—Simplified Methods of Diagnosis.** (For original article, see p. 406.)

DISCUSSION

DR. I. C. RUBIN.—In the matter of the insemination test: Dr. Cary is, of course, familiar with the fact that Dr. Hühner of New York City, practically originated that test in 1912. There is very little difference, it seems to me, between his method and Dr. Hühner's which I have been following since 1912.

I agree with practically all the suggestions and the rules laid down by Dr. Cary in following up a case of sterility. I am not prepared to agree with him about the percentage of cases in which he said infertility might be ascribed to the husband or to the wife, nor in the percentage of cases that the sterility may be said to be due to vaginal pathology, cervical pathology, tubal pathology and ovarian pathology, including endocrinology of a pathologic character. I have studied several hundreds of cases, but am not prepared to draw definite conclusions on those points.

The matter of testing tubal patency interested me tremendously. This method is an exceedingly simple one, and from my experience with both the injection of fluid into the uterus and of gas media, I can corroborate his findings.

I am not so certain, however, that 16 minims is the arbitrary limit of the amount to be introduced, for the reason that if you take a number of extirpated uteri and test their capacity—unless Dr. Cary means a nulliparous uterus which is virginal in character, the capacity of which, without being distended is from 10 to 15 minims— you can distend many a uterus before going in through the tubes. That would be more than 16 minims. I have tried that out a number of times, and before you go in through tubes which are practically normal, you can distend the uterine cavity sometimes with as much as 10 or 15 c.c., and that is a lot more than 16 minims. For example, I had one case, in which the tubes were obliterated and in which the uterus was not too large, but atonic, and in that case I put in 40 c.c. So I think that 16 to 18 minims would lead to error in the hands of less expert observers than Dr. Cary himself.

One of the reasons why I abandoned the injection of fluid was because of the colic and the local irritation and pain it caused when I used argyrol. In February, 1914, I did the collargol injection on rabbits. In April the work was published in the Zentralblatt für Gynäkologie. Dr. Cary I believe published his paper in March. It was a very striking coincidence that our work was practically done about the same time. My work was done upon animals, and I started from an entirely different angle at first. I was first interested in excluding submucous myomata from cases of fibroids that were to be subjected to roentgen therapy because I had learned in studying radiotherapy for fibroids that submucous myomata did not yield to x-ray therapy and that they often sloughed and finally had to be removed by operation.

Collargol causes peritoneal reaction, but I agree with Dr. Cary that the peritoneum takes care of it. There were two objections to collargol from my viewpoint. I abandoned collargol later for argyrol, then bromid solution and thorium nitrate solution. One was that it left inspissated deposits in the tubes, which I thought might lead to occlusion where none existed before. That Dr. Cary has eliminated by using plain saline. I do believe in some cases where there are normal tubes and a mild

degree of peritoneal reaction, that you may get a sealing off of the fimbria where that did not exist before. I do not believe, however, that there is in that any danger to the patient. I recall one case where a housestaff man curetted a patient preliminary to an interposition operation and kept a rather wide calibred irrigating tube in the uterus without allowing for the return escape of the fluid. I was able to demonstrate to his satisfaction in a few minutes, as I was quite sure was the case, that there was a great deal of the fluid in the peritoneal cavity, by exposing the uterus through an anterior vaginal incision. There is no doubt that Dr. Cary's method can be used as a test and is without the disadvantages of collargol and other opaque substances.

On the other hand, I think the capacity of individual uteri varies, so that 16 minims would not be sufficient to go through, in the first place, in a number of instances, and, in the second place, you may get (I do not believe it will be as common) a sealing off at the wrong point without any morbidity that is noticeable.

The advantage, from my viewpoint, of the gas, CO_2 or O_2, over fluid media is that it rises immediately to the subphrenic space. If there is any danger it might arise under the diaphragm, but at least the patient's tubes will not be sealed off. The carrying of infective material by the gas to the subphrenic space is a matter for speculation. In nearly 300 cases I have not seen any ill results. I think in that one respect there is a satisfactory advantage of the gas media over the fluid media.

DR. ROBERT L. DICKINSON.—There can be no question that the Rubin method, using the fluoroscope, is a mathematically exact demonstration.

Dr. Cary's emphasis, I take it, is on *simplicity*. His hydraulic test seems to me as sure as Rubin's gas, but it takes more sensitive fingers and more experience.

I had the pleasure of seeing Dr. Rubin do his quick, expert work in his own office. Of the three patients tested, two had no more reaction than from a vaginal douche. One woman was neurotic and very apprehensive and jumpy beforehand. She went clammy and blue and it was half an hour before she straightened out. She had right shoulder pain.

I am sorry Dr. Rubin did not quote Dr. Reuben Peterson's endorsement and cor-roborative experience.

In attempting artificial impregnation I have lost the fear of peritoneal reaction— timid at first, very gentle on pressure, afraid of carrying more than a few drops into the tube or peritoneum. Having tried with semen and with water some 65 times to carry fluid in, and having succeeded in those in whom the tubes were open, after I dared to use sufficient pressure, I have had but one woman develop anything that would suggest salpingitis or localized peritonitis, that is, only one having to lay up at all. Fifteen minims *into the tubes* is the maximum injected, and four to five should be the preferred amount.

In doing the Cary test a little distress is common, but no more than silver nitrate produces in a cervix. The amount of pain we used to have in the old times in injecting iodine with a pipette into the uterine cavity or in swabbing the cavity of the body with iodine and carbolic was much more than you ordinarily have in these cases. It will not do to advocate the use of either method—either tubal in-semination or tubal patency tests except by skilled hands. Dr. Hirst told me of an artificial impregnation by a woman doctor that developed a blazing pelvic peritonitis and after some weeks he had to take out the tubes, ovaries, and uterus. I under-stand there was a similar result in a case at Mount Sinai. There is no question but that we have to be sure we are not dealing with active pus in the tubes that may be pushed out into the peritoneum. We have to be sure that we have a healthy cervix. We have also to take care that we touch nothing on the way until we get inside of the cervical canal. We go wearily with a method like this until we know what its risks are.

In the matter of sudden dilatation of the whole uterine cavity vitiating the Cary

test. I disagree with Dr. Rubin. I think I know that a uterus does not dilate under pressure. It does in curetting for abortion. We see this when the curette wanders about in the uterus in a flabby-walled cavern. That kind of thing doesn't happen with the nongravid uterus. With closed tubes you get in 10 minims and no amount of pressure will push in more. This proves that dilatation does not occur. With tubes open, a few, 6 or 8, or rarely 10, minims have passed out of your pipette; there is resistance. Then it is gone. When four or five minims more pass, you know they have passed somewhere beyond the uterine cavity. How do you know? Because you try to recover that material from the uterine cavity and it is not there. I can get back 5 and sometimes 8 minims. The rest is not there. There is not a drop of it in the vagina. A perfect illumination with the head light proves it, and also that Dr. Cary's strip is unnecessary.

Bovée and Stone many years ago used tubal injections of iodine when they were about to open the abdomen. They could open some closed tubes. They found that iodine did not produce adhesive pelvic peritonitis, and if iodine does not do it, sterile fluid is not likely to.

DR. H. D. FURNISS.—I went to see Dr. Rubin do this work and was impressed with the simplicity and the inocuousness of it. We are doing this work in our clinic and office and it is a rule that no operation for sterility is to be done until the patient has passed this test. Whether you believe in some form of pessary, curettage or cervical plastic, this test will obviate many unnecessary operations.

A few days ago, I tested out a woman with secondary sterility with the Rubin test and it was positive at 100 millimeters. When the test was over and the cannula withdrawn from the uterus, I heard so much bubbling from the uterus of a large amount of gas that I think there was probably more than 16 c.c. in the uterine cavity.

I saw Dr. Rubin's apparatus. He had been reducing the pressure of the gas tanks from 800 pounds into another tank down to about 100 pounds. Many manufacturers make a pressure reducing apparatus to be attached directly to gas tanks. With this, pressure can be reduced from 800 pounds to zero and nicely regulated for any point between. By using in connection with this a Tycos or mercury manometer, the apparatus can be regulated to within one millimeter or less. In performing the test the maximum pressure is set at 200 mm.; no matter what rate the flow.

We use the same pulsating meter as Dr. Rubin. If we are sure that there is no leak in our apparatus, and that no gas escapes at the external os, I do not think it necessary to prove the passage of gas by fluoroscopy. If the meter shows its passage, it must have gone into the abdominal cavity. Nor do I think it necessary to use the amount recommended by Dr. Rubin—40 c.c. being enough.

To prove there is no leak, put a bivalve speculum in the vagina, elevate the pelvis, and flood the vagina with a mild antiseptic solution, above the external os. If there are no bubbles there is no leak.

I think we can simplify the apparatus in this way. Use a 50 c.c. syringe, known not to leak. Fill this with CO_2 by having the gas displace the piston—care must be taken that the flow from the tank is slow and the pressure low. Connect the syringe to the cannula and inject. Through a T connection, a manometer can be used to show the pressure. Leakage at the external os can be demonstrated by the method of flooding the vagina above mentioned.

DR. H. N. VINEBERG.—Dr. Dickinson referred to the case of artificial impregnation in Mount Sinai Hospital with development of a serious infection. I want to speak of this case. It was one of Dr. Hühner's cases. Since that case he has given up artificial impregnation. It was one of the worst cases I have ever operated on. She had an inflammatory mass reaching to the umbilicus. In that instance there was a tuberculous obstruction of the tube followed by this tremendous infection. We kept

her under observation for some time and finally had to do a most radical operation to save life.

DR. JOSEPH BRETTAUER.—I was very much impressed by Dr. Cary's paper, and even if we do not succeed in relieving these women of sterility, we will have gained much if this Society puts itself on record emphatically, regarding the positive harm the curette does in these cases when it is employed indiscriminately.

We have all seen patients that make the rounds and have been curetted twice, even three or four times, until they either become amenorrheic, temporarily or permanently, or else become infected.

I believe that closed tubes in the absence of any history or evidence of gonorrheal infection, must not necessarily be the result of a colon bacillus infection. I believe that physiologically there is a possibility of closure of the tube as a result of the ovulation process; the importance of this has been underrated and under-estimated.

DR. WILLIAM H. CARY.—If there is one thing especially that I do not want to appear to do or be accused of doing, it is to not give another investigator credit for what he does. I made a special effort in the conclusion of this paper to state that this insemination test was not original except in its application, and in the publication of this paper Dr. Hühner's work will be given full credit. I only claim originality for its application in the sense of its being a standardized technic, carried out and established. I think, on something like a practical working basis.

In regard to the capacity of the uterus, I can only say that I have injected these patients before opening the abdomen and have measured the amount injected, and I am sure that the men who have assisted me in my operations will bear me out that when as many as 16 minims have been injected fluid escaped through the tube, and if you see it thus demonstrated it is most convincing. Sterility cases are usually nulliparous women. The pipette takes up a great part of the capacity of the uterus to begin with. Now, the French have done extensive work in measuring the capacity of the uterus and they state it as an average of 8 minims. I have doubled that amount in the test, that I suggest, in an effort to be on the safe side; and aside from the question of the amount injected, it is the simplification that impresses one, when with the proper technic and the most gentle pressure you see the saline disappear in the rather dramatic way in which Dr. Dickinson expressed it.

I am one of the first to subscribe to the ingenuity of Dr. Rubin's method. I simply feel this is another means, perhaps a simpler one, which I think may be utilized for proving tubal patency.

NEW YORK ACADEMY OF MEDICINE
SECTION ON OBSTETRICS AND GYNECOLOGY
STATED MEETING, HELD APRIL 26, 1921

DR. HAROLD BAILEY IN THE CHAIR

DR. JOHN H. TELFAIR reported a **Fatal Case of Rupture of the Uterus**.

This patient, thirty-two years of age, para v, went into labor at 6 A.M., August 15, 1919. At 2 P.M. the patient was delivered by podalic version and extraction. The physician who delivered her left shortly after. About an hour after delivery the husband of the patient notified the attending physician that there was something wrong and asked him to return. The physician said it was not necessary and did not respond. About two hours after delivery the husband went to the physician and told him he thought his wife was dying. The physician

said he would come after dinner. At 7 P.M. the woman was seen by the attending physician, who immediately called an ambulance and sent her to Fordham Hospital. When admitted to the hospital at 8:00 P.M. she was in profound shock. I would venture the opinion that had this woman been seen within an hour or so of delivery her life might have been saved.

Examination upon admission to the hospital showed a deep laceration of the left side of the cervix extending upward into the lower uterine segment. Immediate laparotomy showed the laceration extending into the anterior uterine wall. A rapid hysterectomy was done and infusion given, but the patient died one hour later.

Opinion as to the treatment of rupture of the uterus is divided. There are those who believe in laparotomy for all cases, and those who believe in packing, if the peritoneal cavity is not entered. If the rupture is not complete, and can be thoroughly explored by the fingers, it may be safe to pack it, but I do not feel that any case that I have seen could have been safely handled in that way. The gross mortality from rupture of the uterus is about 55 per cent. Owing to the difficulty of determining the extent of the injury, I feel that it would be best to subject every case to laparotomy.

DISCUSSION

DR. H. C. BAILEY.—Dr. Williamson reported two similar cases occurring on our service, that were packed. In both instances the rent extended beyond the vaginal vault, being incomplete tears, and one recovered. In one there was a great deal of bleeding at the time of rupture. She was thoroughly packed as there was an extensive tear into the broad ligament. She recovered after a long period of fever. Then she had a thrombophlebitis of both legs, and she finally died after a long-continued stay in the hospital. We have had a number of cases at Bellevue, where, as on the Fordham service, they are likely to come late and our experience has been unfavorable. However, I recall one case that recovered where the uterus was ruptured following the delivery of a large baby. The woman was brought in with the baby's head removed and the shoulders locked in the pelvis, and she recovered following hysterectomy. I had a case recently where, following forceps attempts, a version was performed. It was immediately recognized that there was a rupture of the uterus. I saw the woman about three-quarters of an hour later. On opening the abdomen there was a large interligmentous tumor of blood extending nearly to the umbilicus. The uterus was removed without difficulty or further bleeding. The posterior part of the uterus between the two uterine arteries remained untorn. This woman died of shock.

It seems to me a certain proportion of these cases with suitable treatment by packing could be saved in this way without the added shock of hysterectomy. If treated by packing, of course, the hemorrhage must be controlled, and there are instances in which this has been done by means of clamps. I know of one instance where clamps were used and the patient recovered.

DR. TELFAIR also reported a case of **Complete Blindness Occurring During Pregnancy.**

The patient was a woman, thirty-six years of age, para v. Her family history showed cancer and tuberculosis. The patient had had scarlet fever in childhood. She had four living children and had had three spontaneous abortions. Soon after becoming pregnant she noticed blurring of vision in the left eye. Following this the right eye behaved in a similar manner, so that when she was ten weeks gravid she was completely blind.

General physical examination showed a marked pyorrhea alveolaris and signs in the chest suspicions of a tuberculous process in the right lower lobe. Examination of the eyes showed complete optic atrophy. The urine output was normal and repeated examinations were negative. The blood Wassermann was negative and blood pressure normal. The spinal fluid was under slightly increased pressure but was otherwise negative. The x-ray examination showed no pathologic lesion in the skull, there being no evidence of intracranial pressure and the sella turcica normal. The blood chemistry examination showed normal results. The neurologic examination suggested the possibility of a tuberculous lesion involving the optic chiasm. Because of the marked pyorrhea, most of the teeth were removed and the others treated, but this had absolutely no effect upon the vision of the patient.

She was admitted to the hospital on February 17, 1921, and is due April 30.*

DISCUSSION

DR. CHARLES GRAEF.—The question is whether the blindness is due to the pregnancy or to some other cause. Optic atrophy is roughly divided into two classes. Primary or simple atrophy, which comes without any inflammation, usually due to such conditions as locomotor ataxia, paresis, or multiple sclerosis, etc.; and secondary optic atrophy which follows inflammations of the nerve due to many causes. The disturbance of the uterus in pregnancy, and the toxemia of pregnancy are often among these causes. We distinguish these two types of optic atrophy by certain appearances of the fundus. The fundus in the case of this woman has the appearance of a secondary atrophy. In primary optic atrophy there is a thinning of the optic nerve as it comes through the lamina cribrosa giving a so-called pepper-box appearance to the optic nerve head, with shallow cupping. In the secondary form which follows inflammation, there is an exudate and a deposit of connective tissue formation on the nerve head. In both forms the color is much the same, but there are these differences in the appearance of the nerve head that show if it is due to preceding inflammation. In the secondary form the vessels are small, corresponding to what one would expect in a secondary process following swelling and pressure, while in the primary process the vessels are not much affected. One cannot say with absolute certainty, of course, but the indications are that this is a secondary optic atrophy. She must have had the optic neuritis at the time she became pregnant or soon after. These cases usually occur in the later stages of pregnancy. If it were a primary optic atrophy, there would be no hope of recovery of vision. Since it is secondary, there may be a few nerve fibers remaining alive, and as you well know after delivery there is a general stimulation of absorptive activity throughout the body; it is possible that this may have some effect upon the optic nerves and that she may thus recover a certain measure of sight. It is not very promising however.

As for the causation I can only add that the absence of albuminuria or other toxic blood condition as found by Dr. Telfair when she came under his care does not prove that this patient was free of these throughout her pregnancy. She may have had such a condition when the optic nerves first suffered; this disappearing in the later months.

Again, changes in the generative apparatus are often the source of more or less serious eye affections even when tests of blood, urine, etc., are negative, and if this obtains independently of pregnancy we may accept it as occurring with that condition at times also.

DR. H. C. BAILEY.—I had a very peculiar case that illustrates what may

*Patient was successfully delivered, but continued totally blind when last seen on September 12.

occur from the functional standpoint. A woman who had a preeclampic condition in her first pregnancy, and also in a third pregnancy, had in her second pregnancy at the eighth month, one hour after rising, complete blindness. She was taken to the hospital, and when she arrived she had to be led in. In an hour or so she began to see a little. By 4 P.M. the blindness had quite cleared up. Her eyes were examined in the evening and nothing could be found in the eye grounds. The next day she could see, though she could not read. On the fourth day she returned home and went through an uneventful labor. We explained it on a functional basis. The woman's husband was in the war and she was going through this pregnancy feeling that she did not desire to see the light of another day, and so she had this functional disturbance and did not see the light. She had a normal blood pressure and no albumin in the urine.

DR. GRAEF.—I have had some similar experiences. If one does not find anything in the fundus and sudden, passing, blindness occurs, it is due to uremic or circulatory disturbance in the optical cortex in the occipital lobes of the brain, or else it is a case of hysteria. Hysteria of that type is very common. People will get suddenly blind and then by and by the blindness will clear up without visible change of any kind in the eyes. This patient absolutely had no uremia and so we put it down to hysteria or fleeting circulatory effects. There is an interesting type of visual disturbance which we call "scintillating scotoma." The patient will often tell you that she has headache preceded by seeing zig-zag scintillating spots. This condition is due to a circulatory disturbance in the occipital lobe. In Dr. Bailey's case the fleeting character of the disturbance indicates that it is circulatory in origin. Of course, you know that there is much circulatory disturbance during pregnancy, and the blindness may be due to such a disturbance or else it is hysterical in a case of the type described.

Dr. O. M. MAGID presented a report of **Ectropion of Abdominal Viscera.**

I am presenting this specimen because of its rare occurrence as evidenced by the small number of cases reported in the literature and also because of the diagnostic difficulties it presented in the first stage of labor.

The mother of this stillbirth, M. B., para i, twenty-seven years old; married in 1917. In November, 1919, she was operated upon for an ovarian tumor on the right side, and chronic appendicitis. Her menstruation continued regularly until May 18, 1920. During the pregnancy she felt perfectly well. On the twentieth of January, 1921, I had occasion to see her owing to severe pain from extrusion of internal hemorrhoids. While making a general examination, I found that the size of the abdomen did not correspond to the period of gestation as stated by the patient. I could not hear any fetal heart sounds although the patient said she felt life.

On Feb. 1, 1921, the membranes ruptured. On auscultation the fetal heart could not be heard. Again the apparently small size of the abdomen impressed me. I sent the patient to the hospital. By vaginal examination I observed a thinned out condition of the lower uterine segment; the cervix with its closed os, was firm and button-like; the presenting part was soft and yielding, suggesting a breech presentation. The patient had irregular labor pains until the morning of February 5, when they became more regular and severe. The examination revealed a dilated os of about three and a half fingers, and extruding from it was a mass about the size of an orange. Adjoining this was a smaller mass about the size of a peach; there was a sulcus between them. The two masses were somewhat firm and seemed to be joined together higher up. The patient bled considerably at the time; al-

though her pulse, 90 per minute, was regular and of good quality and she did not appear to be suffering from loss of blood.

It is needless to relate the numerous possibilities of diagnosis that came to my mind while pursuing a watchful waiting policy. In the course of one hour, the two masses presented themselves at the vaginal opening and with them, came a loop of what seemed at first to be the cord, but was soon recognized to be small intestine, the two masses being lobes of the liver. Soon after the above structures were born, the remainder of the fetus was expelled in the transverse position in extreme extension.

Instead of the cord, there were a few strands of tissue connecting the body of the fetus to the mother. These I tied and cut. The placenta was large and showed extreme fatty degeneration; it was expelled spontaneously forty-five min-
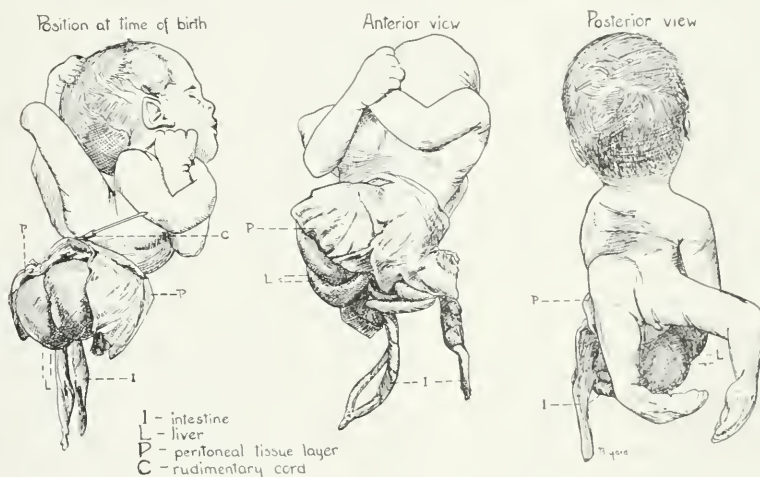
Fig. 1.

utes later. The patient made an uneventful recovery and left the hospital on the tenth day.

The fetus presents a normal appearing head, chest and upper extremities. One would judge it to be that of an eight months' gestation. Instead of the abdominal wall covering the liver and intestines, there is just a thickened peritoneal tissue layer. This apparently ruptured *in utero*. There is an absence of the bladder and genitals; the right lower extremity has no hip joint articulation and the buttock is missing. Both extremities are rotated so that the feet point toward each other.

DISCUSSION

DR. BAILEY.—The specimen shows a number of things of considerable interest. First the vessels go directly from the placenta to the fetus without any cord. This is a very rare formation. The fact that the entire abdominal contents are in the ectropion indicated not only a failure of the visceral arches to unite, but is further due to a defect in the allantoic stalk and there is a retroflexion for that reason, for as you notice the fetus is beat almost double with the back greatly curved. It seems that the amnion joins directly to the abdominal wall along the edge and one might reason from that that it was due to adhesions of the amnion and that the placenta had failed to become separated. In other words the fetus was attached directly to the placenta without a cord.

DR. ALFRED C. BECK read a **Preliminary Report on the Treatment of Syphilis Complicating Pregnancy.** (For original article see page 416.)

DISCUSSION

DR. JAMES B. GIVIN.—I have followed up some of these cases, and have been struck by the absence of luetic stigmata as compared with another set of children of syphilitic mothers who came to the pediatric clinic and who showed four-plus Wassermann reactions.

An interesting feature in this series of cases is the ease with which these babies responded to antisyphilitic treatment. They were given inunctions of mercury and not salvarsan. These observations have shown the importance of continuing antisyphilitic treatment of the mother after the baby is born. The babies cannot be kept on the breast when the mothers are resistant to treatment. We hope to be able to follow this series of children for a number of years and it may be that later these children will show evidences of retarded syphilis. If any of the late signs of syphilis appear it will emphasize the importance of following up these cases, keeping them under treatment, and repeating the Wassermann tests at stated intervals.

Dr. Beck's statistics are interesting in comparison with those published by Dr. Jeans, of St. Louis, who has done a great deal of work in congenital syphilis. Dr. Jeans shows from his personal work and a review of the literature that 30 per cent of all pregnancies in syphilitic families terminate in death at or before term. Dr. Beck's cases show quite different statistics. Dr. Kolmer in the American Journal of Diseases of Children, May, 1920, shows that about 5 per cent of all children coming into a clinic in a large city are syphilitic and that about 5 per cent of the cases coming to a prenatal clinic are syphilitic. The children of these mothers, if properly treated, certainly will not show evidences of lues.

DR. GEORGE W. KOSMAK.—I am interested in Dr. Beck's paper, particularly in the statistics he presents, and more so in his conclusion. I was afraid he was going to say that he had 32 cases of undoubted syphilis but I notice that he modified that assertion somewhat. It is scarcely fair always to assume a positive diagnosis of syphilis simply because there is a four-plus Wassermann reaction.

At the Lying-In Hospital we find the usual proportion of positive Wassermanns and a large number of Wassermann tests are made, but all cases are not tested owing to the fact that many are emergency cases. The babies, however, are tested not later than two to four days after delivery. Many positive Wassermann babies are strong and vigorous and show no evidence of lues. Therefore it makes us rather doubtful whether we ought to make a diagnosis of syphilis where there is a positive Wassermann but no other evidence of syphilis. In women it is very difficult to get a history of a primary lesion and the secondary symptoms are so obscure that it is difficult to get any definite information. Of course we must have something definite to go by if we are to establish a standard method of treatment for syphilitic patients, but it is a question whether we should depend upon the specificity of the Wassermann test since it has been found that many other conditions give a positive Wassermann reaction,—conditions having no relation to syphilis.

Dr. Beck truly asks "Is it fair to subject one of these women to rigid antisyphilitic treatment who shows no evidence of syphilis but a positive Wassermann reaction?" Of course it is true that we may not be able to find such evidence until the child is older, nevertheless, I think we should exercise great caution in subjecting women to the prolonged treatment that this disease requires.

I should like to ask whether the diagnosis in infants stillborn is based upon autopsy findings or merely upon the fact that they were stillborn. In determining the presence of syphilis we have made use of a history of miscarriages and stillbirths. If a woman gives a history of one or two stillborn children, we say that she probably has syphilis, and that the stillbirths are due to this cause. In this we are liable to err. In many of these women the miscarriages are due to external causes; they may be induced and we attribute them to syphilis, so we have to be extremely careful in diagnosing syphilis from this source alone.

DR. FREDERICK W. RICE.—At Bellevue and Manhattan Maternity Hospital we have been taking the Wassermann reaction on every pregnant woman and we have been giving vigorous treatment. If we find a positive Wassermann reaction in the prenatal clinic we turn them over to the genitourinary department for salvarsan treatment every two weeks with mercury between. The babies we treat for one month and then turn them over to the children's clinic. Just what the results will be I do not know as we have not made any study of our statistics.

The Wassermann test has also been of great value in allowing us to give the babies who are in need of more nourishment to mothers to nurse who are free from syphilis.

DR. BAILEY.—I should like to ask a little more about the dangers of giving salvarsan. One case arriving at the hospital three days after its use presented the symptoms of acute yellow atrophy and this patient died. The medical examiner refused to do an autopsy because he said deaths were frequent from this cause.

DR. BECK.—I was able to follow up in all, 73 cases in which the Wassermann reaction was four-plus in this series. We reported only 32 cases because of doubt due to the insufficiency of the follow-up records. Many more cases will be included in the complete reports. However, I believe I have included all the deaths. In the beginning of the study the question came up, "did all these women have syphilis who gave a positive Wassermann reaction?" Up to eighteen months ago I refused to treat a woman when she had a four-plus Wassermann and no other evidence of syphilis. The majority of the women gave negative histories of syphilis, and did not recollect having had a rash or a sore, as Dr. Kosmak has pointed out is usually the case. Hence one must rely upon the Wassermann reaction, and because of the severity of the treatment I have insisted upon having each Wassermann checked up by a second test, either in my own or in some other laboratory. Twenty-nine of these 32 women were definitely syphilitic. Three of the cases had single four-plus Wassermann reactions and showed evidences of syphilis.

From what I can gather from the literature and from our own observations, I think it is the consensus of opinion that whether the Wassermann reaction is four-plus or negative during the first month of life does not signify much. Infants may show a positive reaction and then a negative one and never show any evidences of syphilis. I think we do not know all that we should about the Wassermann reaction in pregnancy and in the newborn.

None of these cases were autopsied. One occurred in Bellevue Hospital, and I could not say that the death was not caused by syphilis as I did not wish to place the benefit of the doubt on the good result side. However, I cannot say that these children died of syphilis. One death occurred in the outpatient series and two miscarriages occurred at home, in which I did not have the opportunity to do an autopsy. We based our diagnosis of syphilis on the positive Wassermann and other evidence of syphilis in the patient.

With regard to Dr. Bailey's remarks, we do not hesitate to give salvarsan, and we give it in a large number of patients. These 32 cases were merely picked ones. We have a great number of cases in which one, two or three injections of salvarsan have been given, that are not included in this series. Hirst has said that he is afraid to give salvarsan in the last two months of pregnancy, but most of the cases in this series have been given salvarsan in the last two months of pregnancy without bad results. They were treated in the genito-urinary department and the pediatric clinic. We have used different prepara-tions and have not found any that gave severe reactions. We have given it in several cases in which there was nephritis and toxemia and they were not harmed. The blood pressure and temperature were watched. There was no rash antepartum or other bad results.

Department of Reviews and Abstracts

Conducted by Hugo Ehrenfest, M.D., Associate Editor

Collective Review

Antenatal Syphilis

By A. N. Creadick, M.D., New Haven, Connecticut

INCIDENCE

TWO means are available for combating syphilis; first, by isolating each patient during infectious periods, and secondly, by controlling hereditary transmission of the disease. The latter problem is forced upon the obstetrician and gynecologist particularly by reason of the fetal morbidity and mortality. History of previous infection and evidences of the disease are so difficult to elicit from female patients[1, 2] that routine complement-fixation tests on each case are necessary as well as histologic examinations of the placenta and necropsies on fetal and infant dead before syphilis can be excluded. The fundament of a preventive campaign is first a knowledge of who is diseased and how many are diseased. The estimates of the prevalence of syphilis in the population as a whole are not in agreement and none can stand the test of examination. Morrow for the United States, Fournier in France and Blasko in Germany have been quoted for years but the time is certainly ripe for a verification or contradiction of these figures. Two methods are available for the achievement of accurate statistics, (a) making syphilis compulsorily reportable and (b) analyzing statistics from a cross-section of the population and correcting for the whole. A third method suggested by Malzberg[3] is a routine Wassermann on applicants for insurance. The investigation of the incidence of syphilis in the population is attended by some difficulty, for instance, "the relation of syphilis to stillbirth and infant mortality is such that we feel morally certain the effect is severe; yet the actual figures are more difficult to secure, for the question of failure to report stillbirths and pardonable zeal to suppress the real cause, when that is syphilis, is understood."[4] Besides, a large amount of recent syphilis is treated by quacks who certainly do not report their cases. A third fallacy in connection with mortality statistics lies in the fact that a large group of syphilitics are reported as dead from secondary diseases without the syphilis being noted.

The most reliable cross-section of the population may be found in general hospital admissions. However, in using such figures allowance must be made for the fact that this is a special group, and that it contains a higher proportion of poor and well-to-do, with a lesser proportion of the middle class. Perhaps one of the fairest observations will prove to be those made routinely on pregnant women from all walks

of life applying to well-organized woman's clinics for care. In 4000 such cases reported by Williams,[5] 2.48 per cent of white and 16.29 per cent of negro patients were syphilitic. At Ann Arbor, Reuben Peterson[6] collected 28 cases of syphilis from 477 consecutive admissions or 5.8 per cent. This author estimates the number of syphilitics in the United States as between 3,000,000 and 4,000,000. From the Sloane Clinic[1] out of a series of 1520 admissions 8.7 per cent were positive by the Wassermann test. Other smaller series have been published whose findings vary more widely as one would expect.[7, 8]

Adair[9] collected statistical evidence showing that syphilis plays an insignificant rôle during the first two trimesters of pregnancy. While Routh[10] believes the lesion is inactivated during this period by fetal or chorionic "resistance ferments" analogous to the proteolytic enzymes associated with implantation, all clinicians agree that the serious effects as regards fetal life manifest themselves after the seventh lunar month and increase rapidly during the remainder of pregnancy and labor. For the mother it is claimed that puerperal morbidity, nephritis in pregnancy, and sepsis are more common complications in luetic patients.[11] Certainly for the infant an astounding morbidity and mortality can be demonstrated. "Congenital syphilis is more serious than acquired" and is more difficult to eradicate.[12] In Tarnier's Clinic between January 1, 1915, and August 31, 1916, there were 118 pregnancies in syphilitic patients cared for, of these 60 per cent ended in stillbirths and 40 babies or 22 per cent were taken home alive.[13] Mott collected histories of 175 pregnancies in 34 syphilitic women which showed 104 infant deaths, premature and stillbirths, with 41 living diseased children and 30 healthy children. Mr. Bishop Harman, for a comparative study, collected the histories of pregnancy in 150 syphilitic families and in 150 apparently nonsyphilitic, rating them in terms of 1000:

FAMILIES	PREGNANCIES	STILLBIRTHS AND MISCARRIAGES	INFANT DEATHS	ALIVE BUT DISEASED	HEALTHY
150 syphilitics	1001	172	229	390	210
150 nonsyphilitics	1000	94	114		792

Hornung[14] cites 221 cases of syphilis in pregnant women collected in Kiel between the years 1910-1914, 13 per cent of these pregnancies terminated prematurely (one-third due to other causes than syphilis) and 30 (13.76 per cent) resulted in stillbirth after the fourth month, therefore 85.33 per cent of these pregnancies resulted in living children. Because of the contrast to the English figures given above and other German figures about to be quoted, mention must be made of the fact that some of these patients received antisyphilitic treatment. Kaufmann-Wolf and Abrahamson[15] have finished the fifth of their series, the totals of which show that 25 per cent of the children in 134 infected women grew up healthy, 25 per cent were diseased, and 50 per cent were dead of syphilis.

Obviously, antenatal syphilis is not only responsible for a large percentage of stillbirths and infant deaths, but also is far-reaching in childhood, adolescence and early adult life (*vide infra* "*Tardy hereditary syphilis*"). This is no less striking in American statistics as com-

piled by Royster[16] who found 12.5 per cent of 1000 children who had inherited syphilis applying to a free clinic for treatment; of the white children 7.04 per cent and of the negroes 15.47 per cent were affected. Churchill and Austin[17] give the incidence of hereditary syphilis in New York, Chicago, St. Louis, and San Francisco hospital infants as varying from 2 to 6 per cent of the total admissions. Based on such reports Kolmer[18] pleads for further study and prevention of prenatal syphilis. Sabouraud[19] called attention to the fact that it used to be said of Fournier that "he wanted to make of general pathology an annex of syphilography" and that time has but proved that he did not go far enough. Sabouraud recites problems which require further study such as the question of the subsidence of the disease with age, the curve of the Wassermann reaction in hereditary syphilis over a long period of years and the relation of the gravity of acquired as compared with congenital syphilis. Persevering, systematic research will solve these problems as well as the question of conceptional syphilis and its effective treatment.

PATHOLOGY

Indubitable evidence for the diagnosis of syphilis is based on the demonstration of the Spirochete pallida, for which is claimed a genito-tropic tendency.[20, 21] This organism is found in the semen of syphilitic males independent of evidence of a specific orchitis.[22, 23] The spermatozoa in these cases show numerous abnormal forms, 55.8 per thousand as compared with 18.6 per thousand in the normal healthy male. Incidentally this pathology of the spermatozoa is considerably greater in cases of inherited syphilis at puberty.[24] Evidence of the typical external primary lesion in the female is so seldom procured that another avenue of entrance for the organism must be available. It has been suggested that the uterine cavity, tubes and peritoneal cavity are a possible avenue of entrance for the semen-borne spirochetes. Granular, spore-like, resting, nonflagellate forms of spirochete have been described [25, 26] and may be present with the spermatozoa. Clinical manifestations of congenital syphilis differ in type, in malignancy, and result, depending on the existence in one or both parents of latent lues of long standing, conceptional infection or postconceptional infection. Brown and Pearce[27] in experimental syphilis in rabbits claim that the reaction of pregnant or lactating females when inoculated is ordinarily most resistant, while occasionally this resistance is absent and a florid invasion occurs. The specific infection of one or both parties to conjugation results in syphilis in the offspring, demonstrable by continued and systematic examination and serological tests. Very rarely apparent exceptions to this rule may be found when the disease in the parent is of long-standing, latent and of low virulence.

Manifestations of the disease during gestation may be divided into changes (a) in placenta and membranes and (b) in the fetus itself. The specific organism may be found in the placenta from about one-third of the cases [21, 28, 29, 30, 31] although only after a very careful and prolonged search.[32, 33] The histologic picture of placental syphilis, first described by Fraenkel,[34] has been questioned in detail especially by Hitschmann and Volk,[35] but is maintained[36, 37] as specific when found and more reliable than the serological tests. Unfortunately, syphilis of the fetus with death in utero may take place without the

typical placental histology and without a demonstration of the treponema in the placenta, on the other hand the organism is much more frequently demonstrated in the umbilical cord.[38, 39] Histologic evidence of syphilis of the cord was described by Bondi[40] as a polymorphonuclear leucocytic invasion of the perivascular spaces. The specificity of this picture for syphilis has been denied.[41]

In the fetus spirochetes are more readily found in the liver,[42] spleen,[43] kidney and, in addition, typical histologic pictures are apparent in other organs.[44, 45] The clinical course and physical signs of congenital syphilis in children born alive is reviewed by Post[46] who emphasizes the well-known stigmata, snuffles, rhagades, cranial exostosis and defective development. A complete bibliography of this subject has been compiled by Gralka.[47] The most striking picture is presented by the facies and the typical skin picture. Apparently the skin lesion may be bullous according to Sequeira[48] and Stelwagon[49] when presented at birth and later becomes maculopapular. By the time the patients were one month old or more, Veeder and Jeans[50] in a study of 100 cases reported the presence of an exfoliative, desquamative dermatitis in 50 per cent and no instance of the bullous type. Highman[51] believes that the type of skin lesion indicates the stage of development of the fetus *in utero* at the time of its infection. Carman[52] has collected the literature and described bone lesions pathognomonic of syphilis and Shipley with his collaborators[53] studied the skeletons of 300 white fetuses from the sixth month of intrauterine life to term in which they demonstrated typical syphilitic lesions marked in 25 per cent and well marked or suspicious in 46 per cent. All the bones are involved but there is apparently no interference with skeletal growth.[54]

When gross lesions of an active process are lacking in the mother, before demonstration of the organism in the fetus or the histologic pathology in the placenta is possible, the uniform routine application of the complement-fixation test will demonstrate syphilis.[57, 58, 59] There are qualifications of this broad statement, for occasionally faintly positive reactions appear in the nonsyphilitic, due to a too delicate cholesterinized antigen or some intercurrent metabolic disease like eclampsia.[60] However, there is no clear proof that syphilis may not underlie this last type of case for there seems to be no relation between the degree of toxemia and the strength of the reaction.[57, 60] Nor does the fact that the reaction disappears have a definite bearing for Menten[61] claims that pregnancy arouses a latent syphilis, affording a positive Wassermann reaction which eventually disappears after delivery. The converse of the qualifying statements would be of even more clinical importance but the instances are few in which the complement-fixation tests are negative and in which ultimately syphilis is demonstrable by other means. The complement-fixation test on the newborn is very much less reliable.[62] Tests on fetal blood from the cord are anticomplementary, and positive reactions are obtained less frequently until the infant is one month old. After that age until ten or twelve years pediatrists regard the test as specific. Ross and Wright[63] checked their series by different means. Again it appears that positive findings are more valuable than negative. DeBuys[64] alone and with Loeber[65] correlated the luetin intracuticular test and the Wassermann tests. His conclusions are that the luetin test is more specific

in early infancy, is available when blood for the Wassermann cannot be secured, but when both are negative, syphilis cannot be excluded in all cases. Gordon's results[66] corroborate these findings. Two series of cases with cerebrospinal involvement have led Jeans[67] to claim that one-third of the children with congenital syphilis develop such lesions and Kingery[68] reported lumbar punctures which give specific findings before the paralytic lesions occur.

<p style="text-align:center">TARDY MANIFESTATIONS OF INHERITED SYPHILIS</p>

The unusual and later manifestations of the disease may be of more interest to the pediatrist and internist, but serve, in such a review as this, to impress the profession with the necessity of adequate ante-natal treatment of the mother and intensive care of the newborn even in the absence of gross evidence of the infection. In one instance[69] an ulcer which appeared during the first month at the site of the umbilical stump and resisted ordinary measures, gave a positive smear and healed under specific treatment. A larger and less well-defined group represent what Zerbino[70] refers to as the "distrofia heredo-sifilitica" consisting of malnutrition, underdevelopment and imperfect digestion, ascribed by Ribadeau-Dumas[71] to affection of the liver, pancreas and parotid. These cases, according to Hutinel[72, 73] are less resistant to intercurrent infections and may account for nephritis, rachitis and certain of the anemias in a second generation. The last-mentioned author and others[74, 75, 76] make more of the frequency of involvement of the liver, spleen, brain and glands in congenital syphilis. "Pluriglandular dysfunction" is noted because of the coincidence of syphilis and hydrocephalus, 50 in 54 cases, in 59 of 69 cases of hypothyroidism, in 34 of 46 cases of mongolism and in 15 of 17 other endocrinopathies.[77, 78] Single instances are reported of splenomegaly,[79] vitiligo,[80] osteogenesis imperfecta,[81] ascites,[82] "Dysenteroid Syndrome"[83] and Vaquez' erythemia[84] associated with inherited syphilis.[85, 86, 87]

Much less vague and more directly attributable to the specific infection are the cerebrospinal lesions, fulminating deafness,[88, 89] sudden blindness,[90] backwardness and imbecility.[91] Lavergne goes so far as to require routine lumbar punctures before acquitting a case of suspected lues.

The subject of dental stigmata in heredo-syphilis has provoked some controversy. Stein[92] emphasized the fact that such lesions (a) may be the only evidence of the disease; (b) may call attention to the etiology of some other baffling condition; (c) may be of assistance in diagnosing a disease affecting some member of the family, as mother, brother or sister; (d) is of importance in life insurance examinations and (e) will aid in enforcing dental, oral, social, moral and mental hygiene. The particular lesions are (a) Hutchinson's teeth,[93] (b) cuspal erosions of 1st permanent molar, and (c) multiple and systematic dystrophies of the permanent teeth. These lesions are due to a pathological process of long duration, (a) that of the first molars occurs in the sixth month of intrauterine life and (b) that of the central incisors and canines at the time of birth.[94] Sabouraud added a specificity to the lesion of the first molar, the so-called "tubercle Carabelli"[95] but such specificity has been denied.[96] Frequently the first of the tardy syphilitic lesions

are those discovered by ophthalmological examinations.   Motor defects and keratitis[97, 98] occur most frequently.

COLLES' LAW

In 1837 Abraham Colles promulgated a dictum to the effect that a syphilitic father might engender a syphilitic child without the appearance of the disease in the mother who remained immune to the infection.   Matzenauer in 1903 first attempted to discredit this "law" and following the discovery of the spirocheta, 1903, and the Wassermann reaction, 1907, more and more doubt has been voiced until all but a few authors deny its tenability.

Presumptive evidence, originally solely clinical, for Colles' law was based on the fact that so few mothers of syphilitic children themselves gave a history or evidence of active syphilis; even conceptional syphilis, the choc-en-retour of Fournier, seldom resulted in an active process in the mother.   For the specific rendering of the law an infection of the embryo of paternal origin is requisite exclusive of the maternal pathway, and the subsequent development of an immunity on the part of the mother.   This might be effected (a) by erosion, (b) by the inoculation of the ovum, or (c) by the spore-like granules.[12]   Colles' law is discredited on the basis that the spirocheta is too large to be carried on or in the spermatozoon.[21]   Besides, so many Wassermann tests demonstrate a positive infection in mothers otherwise apparently free from the disease that Fildes[99] voices the general opinion in saying that all the mothers are infected.   Until scientific investigation can demonstrate the avenue of paternal infection and the decidual barrier to prevent maternal infection this position is the stronger.   On the other hand, Hochsinger,[100] Boas,[101] Routh,[10, 12, 25] and Williams[102] maintain a more conservative stand and do not admit of the verdict "disproven" for Colles' law, and prefer to "hold the whole question sub judice."   This position is supported by the occasional instance of syphilis in one of twins and in those few cases where syphilis in the mother cannot be demonstrated while the disease is apparent in the father and child.   Even a positive maternal Wassermann during pregnancy may occasionally be regarded as a manifestation of the establishment of active immunity on the part of the mother against a syphilitic product of conception.[103, 104]

Singer[105] reported a case of syphilis in one of twins and collects twelve similar cases from the literature, although none have been so completely followed as that cited by Williams.   In view of the fact that a positive Wassermann in the expectant mother indicates active antisyphilitic treatment in order to guarantee a living child, the particular means of infection must await further study.[106, 107, 108]

TREATMENT

Intensive antisyphilitic treatment of the expectant mother is urged on the practitioner owing to the gravity and incidence of the disease[109] in the hope of developing either a diminution in virulence or an increased resistance.[110, 111, 112]   The spirochaeticidal qualities of the treatment and the development of antibodies may proceed through the placenta or through the milk.   This explanation was offered by Ehrlich for those cases in which the infant improved while the mother nursed it and was receiving salvarsan.   The institution of treatment

before pregnancy justifies a favorable prognosis for the fetus.[113] During pregnancy the prognosis depends on the already present but unknown degree of the infection of the fetus. For the adequate control of the treatment of the mother compulsory notification with emphasis on the special need in that case is advocated by Findlay.[114] The beneficial effects of partial and adequate treatment of the mother as compared with the neglected cases is graphically charted by Williams.[5] If the mother's Wassermann can be brought to doubtful or negative, the baby is negative.[115] In addition to this treatment all infants should be subjected to further antiluetic treatment after birth.[50, 116, 117] The detailed care of the newborn infant with hereditary syphilis is explained by Jeans[118] in detail in reporting a series of 250 cases. This treatment consists in .03 gms. of mercuric chloride per kilogram of body weight intramuscularly weekly and 13 mg. of mercury in chalk by mouth t.i.d. Every two months .01 gms. arsphenamine per kilogram of body weight preceded by a spinal puncture to avoid a Herxheimer reaction. Ramsey and Groebner[119] prefer the 50 per cent mercury ointment and Blechmann prefers 0.02 gms. per kilogram of neoarsphenamine every six or seven days while Fordyce[120] gives larger doses weekly for six to eight weeks.

Pinard's[121] and Villapadierna's[122] cases of postconceptional syphilis prove that there is no feticidal action of salvarsan, neither is there any abortifacient action. Two deaths have been reported, one from acute atrophy of the liver[123] in a syphilitic woman three months' pregnant and the suspected cause was salvarsan. In the other case eclampsia and coma supervened upon an injection of "novarsenobenzol" emphasizing the fact that the arsenical preparations are contraindicated in the toxemias and in nephritic insufficiency.[124] Moore reports the cure of a child with congenital syphilis by means of Donovan's solution.[125]

SOCIAL PROBLEM

"The rising tide of heredosyphilitics"[126] with the resultant economic burden[127] on the community emphasizes the need for segregation during treatment[128] or at least intensive cooperation of the syphilologist, obstetrician and pediatrist in providing thorough study and care of each patient.[129]

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Selected Abstracts

Eclampsia

Young and Miller: The Etiology of Eclampsia and the pre-Eclamptic State. British Medical Journal, April 2, 1921, No. 3144, p. 486.

This paper is published as a confirmation of one issued in 1914. In the first paper the authors were concerned chiefly with the study of the pathology coupled with some experimental work. In this paper they take up the clinical aspects. The proof is derived from the study of some forty cases of toxemia and associated conditions. The following conclusions are set forth in their summary: (1) These conditions are caused by placental degeneration due to interference with its

blood supply. (2) In these cases placental infarction is due to thrombosis. (3) Absorption of placental poisons only occurs through portions of the placenta attached to the uterine wall. (4) Toxemia may be associated with placenta previa or premature detachment of the placenta. (5) Toxemia develops after the hemorrhage and is not to be considered the cause of the bleeding. (6) The major symptoms of eclampsia are due to the absorption of broken down liver cells, and possibly of other tissues, which are killed by the placental poison. (7) The authors compare this with recent investigations on shock (Quenu, Delbet, etc.) showing that the disintegration products of the muscle are toxic.   F. L. ADAIR.

Royal Society of Medicine: Toxemias of Pregnancy. British Medical Journal, 1920, No. 3130, p. 976.

At a recent meeting of the Section of Obstetrics and Gynecology of the Royal Society of Medicine, toxemias of pregnancy were discussed. Clifford White read a paper on sodium bicarbonate tolerance in toxemias of pregnancy. In these cases sodium bicarbonate was administered in dram doses until the urine became alkaline to litmus. If more than 2 drams (8 grams) were required it was concluded that some acidosis existed. He found that severe cases of eclampsia might require as much as 20 grams before the urine became alkaline.

James Young and Miller presented a paper elaborating and confirming the theory of infarction and disintegration of portions of the placenta as a causative factor in eclampsia. It was suggested that some of the major symptoms were due to the effect of the poison on liver cells, leading to the absorption of broken down products. It was thought that postpartum seizures might be accounted for in this way. Those discussing the paper were not willing to accept Young's theory in the total.

Major C. A. F. Hingston presented a paper emphasizing the necessity of the reduction of blood pressure in eclampsia. He regards it as a serious complication and advocates that it be kept down to 120 mm. or less. He considers venesection to be the best means of reducing the blood pressure. Immediate delivery is also advocated in cases where it is possible.   F. L. ADAIR.

Schönfeld: The Toxicity of Placental Lipoids and Its Rôle in the Etiology of Puerperal Eclampsia. Deutsche Medizinische Wochenschrift. 1921, xlvii, 270.

By means of various solvents Schönfeld extracted a fatty mass from fresh human placenta. From this mass he isolated a substance which when injected into animals, produced the same symptoms and microscopic changes of the parenchymatous organs as are found in puerperal eclampsia. This substance, which he is inclined to consider a ferment, is activated by the addition of glycerine and inactivated by heat (75° C.).

Small doses of the substance, repeatedly injected, caused a congestion of the pelvic veins and in pregnant female mice it usually produced abortion. In those cases where abortion did not take place before death, hemorrhages were found in the membranes. Even in those cases where the animals died within from 5 to 10 min. after injection, changes were noted in the liver cells.   R. E. WOBUS.

Gessner: Why Are the Placental Theories of Eclampsia, Especially Hofbauer's Ideas of Placental Ferment Intoxication, Untenable? Zentralblatt für Gynäkologie, 1921, xiii, 469.

Observation of cases of eclampsia, associated with hydatid mole or without fetus made possible Veit's placental theory of eclampsia, a poisoning with syncytiotoxin.

Further investigation proved that the placenta had nothing of the character of an antigen and this theory fell to the ground. Hofbauer thought the condition resembled anaphylactic shock, but there was no similarity between these conditions, since lower temperature, lower blood pressure, and lessened coagulability of the blood are absent in eclampsia. Today Hofbauer has given up this idea, but still believes in an intoxication as the result of a poison from the placenta, a so-called ferment intoxication. This theory, based on an altogether wrong idea, i.e., that the human race is the only one in which eclampsia is present, falls to the ground when it is realized that many other animals with similar placental circulation do not have diseases similar to the eclampsia of the human, but on the other hand, animals with different placentation have diseases similar to eclampsia.

In certain cases large quantities of placental ferment may reach the maternal blood without damage to the maternal liver or kidneys. For example, in chronic nephritis, even if there is a marked infarction of the placenta and a sudden discharge of ferments into the maternal blood, eclampsia is comparatively rare. If a nephritic, or a patient with damaged liver can overcome a sudden discharge of such ferment into her circulation, it would appear reasonable that a healthy individual would be affected even less. W. M. LITTLE.

Zweifel: The Fetal and Placental Theories of Eclampsia. Zeitschrift für Immunitaetsforschung und Experimentalle Therapie, 1921, xxxi, 22.

After a thorough consideration of all the various theories so far advanced to explain eclampsia, the writer takes up in particular the idea of Weichardt that eclampsia represents an anaphylactic shock. Much literature has been published to repudiate this theory, and a series of careful experiments, carried out by Zweifel, force him also to the definite conclusion that this is merely a speculative hypothesis. The injection of fetal and placental albumen from one animal into another of the same species does not cause that hypersensitiveness which would be essential for the development of an anaphylactic shock. HUGO EHRENFEST.

Van Cauwenberghe: Tuberculosis and Eclampsia. Gynécologie et Obstétrique, 1921, iii, 428.

The coexistence of tuberculosis and eclampsia during pregnancy is of such rare occurrence and of such interest that it warrants attention. Three years after the birth of patient's fourth child tuberculosis of both apices was diagnosed. Three months of treatment improved her general condition. Six months after tuberculosis had been diagnosed, she had a miscarriage followed by a curettage. Almost immediately afterwards she again became pregnant and her general condition be-

came worse. The patient was then placed on treatment consisting of, absolute rest, forced feeding and administration of tuberculin. In three months her condition had greatly improved. She gained in weight and at that time there was no albumin in the urine. When the patient entered the hospital the last month of pregnancy, her respiration became difficult, especially at night, and slight traces of albumin appeared in the urine. A week later the dyspnea became more acute, the albumin in the urine mounted and nine days later the patient had a convulsion. She was given bromides and morphine, and bled, removing 300 c.c., followed by injection of one liter of physiologic salt solution. When seen by Cauwenberghe, patient was in a profound coma. Cervix was dilated and version and extraction performed. Rapid amelioration of symptoms after delivery. Patient became conscious. The following day, however, dyspnea supervened which finally led to an asphyxia.

It seems little likely that the tuberculous toxin or tuberculin exert a direct influence, although Sergent has stated that tuberculosis often produces renal insufficiency. The possible indirect action of the forced feeding should be considered. In the causation of eclampsia the author holds to the intestinal origin of the responsible toxins. Everything that changes the proper functioning of the intestinal tract in pregnancy prepares the way for eclampsia. Thus forced feeding, as is practiced in the treatment of tuberculosis may, under certain conditions, lead to this result.

A case of combined tuberculosis and eclampsia must be considered from the standpoint of the two forms of treatment advocated both in the treatment of pregnancy complicated by tuberculosis, and pregnancy complicated by eclampsia, namely, operative intervention or conservatism. It seems that the coexistence of these two affections in the same pregnant woman forces one to lean toward intervention which is the form of treatment advocated by the author.

Van Cauwenberghe is of the opinion that in cases of tuberculosis one should interfere in the early part of pregnancy. Toward the middle of pregnancy he prefers to wait until the infant is viable. In the seventh and eighth months he believes in interference only to save the woman from the fatigue of the last weeks of pregnancy, though realizing that in spite of the intervention an aggravation of the tuberculosis will probably take place, though to a lesser degree than after delivery at term. In tuberculosis of the larynx one should always interfere immediately.

In eclampsia the author advocates interference in addition to medical treatment. The method of interference will depend, of course, upon whether the patient is a primipara or a multipara and whether the eclampsia begins before labor, at the beginning of labor, or near the end of labor.

In the case under discussion, outside of the general indications for intervention offered by the eclampsia, the added imminence of asphyxia as the result of the tuberculosis seemed to demand interference.

The author wishes to draw attention to the fact that tuberculosis places a pregnant woman in a state of lessened resistance and can, among other accidents, produce, directly or indirectly, eclampsia and, in the latter instance, can influence the character of this morbid condition.   R. T. LaVake.

Zangemeister: Fuerpural Eclampsia. Deutsche medizinische Wochenschrift, 1921, xlvii, 549.

According to Zangemeister, the problem of eclampsia has now been definitely settled. He thinks the solution has been unduly delayed by the *a priori* assumption that the cause must be some form of poison. This "poison" he finds to be nothing more or less than water.

For some as yet undetermined reason, the blood vessels become abnormally permeable. Water accumulates in the tissues. This first stage is accompanied by oliguria and an abnormal increase in body weight. As the kidneys become damaged, the urine output is diminished, the body weight increases even more rapidly and the blood pressure begins to rise. This constitutes the second stage of the disease. The third stage, represented by cerebral edema, is ushered in by the so-called pre-eclamptic symptoms, such as headache, vomiting and visual disturbances. Upon these follow convulsions and coma.

Proper prophylaxis consists in the timely treatment of the edema by bed rest, and a diet restricting both solids and liquids. In the second stage the diet is still further restricted and salt prohibited. Perspiration may be induced cautiously. Digitalis is contra-indicated and other diuretics have been found of no value.

In the pre-eclamptic stage the patient is placed in a quiet, dark room and venesection and one or more lumbar punctures made. Morphine or veronal-sodium, of the latter 0.5 gm. intravenously, may be given. Operative interference is always to be kept in mind.

In the treatment of actual eclampsia the following rules have been established:

1. General: constant supervision, the avoidance of irritation by light, noise, etc.; all necessary manipulations under narcosis; avoidance of food and of infusions.

2. Avoidance of labor pains: if labor is in progress, operative emptying of uterus. Mild pains or after-pains are controlled by morphine.

3. Relief of arterial tension: venesection, except just before or immediately after delivery; veronal.

4. Relief of intracranial tension: repeated lumbar puncture or decompression.

In the cases with small, rapid pulse and rapidly rising temperature, mild coma and pallor, heart stimulants and infusions of saline and adrenalin solution are administered. Since these symptoms are due to compression of the medulla, decompression is the only positive remedy.   R. E. Wobus.

Allison: Eclampsia: Further Reports. Texas State Journal of Medicine, 1921, xvi, 444.

Two cases of eclampsia are reported showing certain interesting features. The first case, a married multipara, aged 18 years, had, as estimated by the author, one hundred and fifty convulsions postpartum, followed by complete recovery. This case was interesting further in that lactation did not begin until two months after the birth of the child. At that time she was able to nurse her child successfully.

The second case, a married woman of twenty-six years, had two convulsions before the uterus was emptied of twins, and then several more

convulsions after 91½ hours had elapsed. This patient became totally blind shortly before the onset of the first convulsion. The visual disturbance continued for some time, but complete recovery finally occurred.   NORMAN F. MILLER.

Crainicianu and Popper: Hepatic Insufficiency During Pregnancy. La Presse Médicale, 1921, xliii, 424.

This article involves a study of forty-seven pregnant women during the later months of pregnancy who were selected with an idea of excluding liver affections of any kind. The urine was examined daily for bile salts and pigments and albumin. Blood examinations included many leucocyte counts and numerous observations of the blood pressure. The following conclusions are drawn: In twenty cases out of a hundred there were some signs of biliary retention. In thirty-three out of a hundred, signs were present indicating some latent hepatic affection. The authors report briefly two fatal cases with both clinical and postmortem evidence of dominating hepatic disease. They think that it may be possible by proper hygiene, and especially by rational diet, to avoid the causes of this intoxication. They advise against the use of chloroform because of its deleterious effect on the liver, and recommend nitrous oxide and oxygen as the safest anesthesia for these cases.   F. L. ADAIR.

Von Jaschke: Kidney Diseases in Pregnancy. Archiv für Gynäkologie, 1921, cxiv, No. 2, p. 255.

The kidney of pregnancy as described by Leyden has nothing to do with a purely inflammatory process and the term nephritis gravidarum is therefore to be rejected. The confusion attached to the subject of kidney diseases in pregnancy is increased by imperfections of a nomenclature which has persisted from obsolete conceptions. All processes affecting the kidney, which are of a degenerative nature or of which the inflammatory nature is not beyond doubt, one may with Friedrich Müller group as nephroses, the purely inflammatory form as nephritis. Von Jaschke endorses and reproduces Volhard's scheme of classification of nephropathies into focal nephritis (from infection), genuine nephrosis, sclerosis, and diffuse glomerulonephritis. The nephrosis of pregnancy is characterized by edema, albumin and casts with diminished volume of urine, and an absence of hypertension, cardiac hypertrophy, and eye-ground changes. Histology shows degeneration of the tubules, with no demonstrable changes in the vessels and glomeruli. Rest-nitrogen of the blood is within normal limits and the urine-concentration test (12 hourly specimens while on dry diet) shows no impairment, though excretion of water (8 half-hourly specimens after 1½ liters of water) is generally delayed. According to Volhard, this reaction to these two tests bespeaks a disturbance in water excretion outside the kidney, namely, failure of the water to reach the kidney because an abnormal permeability of the vessels lets it escape into the tissues. Von Jaschke's limited observations agree with Volhard's dictum that salt excretion falls even to traces in the presence of increasing edema, while in subsiding edema or water equilibrium it is normal or more. Von Jaschke conceives of a toxin which causes the epithelial degeneration and an action on the endothelium resulting in the in-

creased permeability. A milk diet for the kidney of pregnancy is not rational; the diet should be antihydropic. Strict rest in bed is essential. Cases of pure kidney of pregnancy are not frequent, and in prolonged observation of several cases no transition to contracted kidney was seen. Recovery, particularly from the edema, is the rule during the puerperium, though the albumin and casts may persist for months.

There occur, however, cases of pregnancy kidney combined with focal nephritis, giving hematuria, and with diffuse glomerulo-nephritis, giving hematuria and also a blood pressure up to 170. "Probably many of the cases leading to eclampsia, as well as the infrequent cases of pregnancy nephrosis that do not recover during the puerperium, belong to this combination form." It is sometimes possible to elicit a history of chills and fever, but in no case was von Jaschke able to trace definitely the origin of the renal disturbance to an infectious process, and he believes with Volhard that aside from the pure degenerative process with edema and without hypertension "there occurs a form prone to lead to eclampsia, a clinical picture of a typical diffuse glomerulonephritis with a strong nephrotic aspect, which we must designate clinically as a mixed form. But histologically the nature of this nephritis of pregnancy carrying with it hypertension and marked edema is as little explained as is its pathogenesis * * * it may be that the hypertension that is added to the nephrosis depends upon a specific placental toxin and is entirely extrarenal."

As sclerosis of the kidney is not common in women of child-bearing age, it seldom is seen combined with the kidney of pregnancy.

For the further clarification of the still confused subject of diseases of the kidney in pregnancy, von Jaschke urges that all cases be studied with all possible means and observed for long periods afterward.

RAMSAY SPILLMAN.

Vignes: **Eclamptic Convulsions.** Le Progrès Médical, April 2, 1921, p. 145.

Vignes reviews the recent literature on eclampsia in an effort to form some definite conclusions. As typical, he quotes the statistics of Guillemet of 156 cases observed at the Baudeloque clinic (1890-1914). Of these, 60 occurred before the onset of labor, 67 during labor, and 29 following labor, 108 occurred in primiparae, while only 48 multiparae were affected.

He believes eclampsia to be more prevalent in winter or, at least, at times of sudden drop in temperature, cold bringing on the convulsions without much warning.

Among the prodromal symptoms he considers facial edema an especially ominous sign, and the epigastric pain as an indication of imminent convulsions.

Of the 60 women in Guillemet's series who had convulsions before term, 28 went to term under appropriate treatment, and of these, 22 gave birth to living infants. Thirty-two women in the entire series died, giving a mortality of 25 per cent, while 52 of the 156 infants died, or one-third.

As prophylactic measures the following are proposed: All albuminuric patients are put to bed on a strict milk diet. Exposure to cold is to be avoided. Cathartics and colonic flushing are used to eliminate poisons. In case of hypertension and excitability, rest, absolute quiet

and chloral are employed, the latter in doses of 4 grams, 10 to 15 gms. per day, given in milk, either by mouth or rectum. This may be alternated with morphine. Venesection is not to be forgotten. Lumbar puncture has a limited sphere of application.

"Obstetrical treatment reduces itself to nothing or next to nothing." Like his teacher Couvelaire, Vignes feels that labor should be neither induced nor accelerated and one should hesitate to employ forceps or any other method of forcible extraction. He believes that either the classical or vaginal cesarean section, for toxemia alone, are useless since the very grave cases will die anyway and in the more favorable cases the patient can be cured by less drastic measures.

R. E. Wobus.

Bear: Eclampsia and Its Conservative Treatment. Virginia Medical Monthly, 1921, xlvii, 487-491.

After a review of the pathology, etiology, diagnosis and prognosis of eclampsia, the author discusses both the prophylactic and curative treatment of the disease. He does not recommend cesarean section unless the disease is complicated by a contracted pelvis or tumor formation. In his hands best results were obtained by venesection, morphia, catharsis and diaphoresis. Under such treatment the patient usually falls into labor promptly. When fair dilatation is accomplished, a bag is introduced or manual dilatation of the cervix done to hasten delivery. John W. Harris.

Engelmann: Is the Therapy of the "Middle Line" in Eclampsia Still Justifiable? Zentralblatt für Gynaekologie, 1920, xliv, 1113.

Volhard has drawn a parallel between the pathologic anatomy of the kidney in trench nephritis and in eclampsia. Engelmann believes that a sharp distinction between eclampsia and eclamptic uremia is not always possible; the clinical entity termed eclampsia has no single etiology, but may be produced by different conditions and causes, of which the supposed pregnancy toxemia is one.

It is not logical to omit from the classification of eclampsia those cases in which at autopsy the findings are characteristic, even though there have been no convulsions. The severity of the toxemia bears no relation to the number of these and yet the practical side of the question is that in statistics there is no distinction between light toxemia with say one convulsion and the very severe toxemias.

A further question is the relation of eclampsia to nephritis. There is eclampsia following nephritis, true eclampsia, and the false eclamptic uremia. In certain clinics the differentiation may be made, but to the majority of practitioners blood chemistry is inaccessible. This is still more complicated by the fact that, according to Volhard, there is a transition from the false to the true uremia, which may occur during pregnancy. Cases that were definitely eclamptic clinically, do not always show characteristic results at section. The recognized anatomical alterations are not specific for eclampsia. The kidney of eclampsia resembles that of Bright's disease. Barr ten years ago declared that the typical alterations in the liver were not pathognomonic for eclampsia.

As true eclampsia should be known that form which we see in pre-

viously healthy primipara, apparently the result of increased metabolism, and that variety that is noted chiefly in multiparae, which apparently arises out of a preliminary nephritis.

Bumm in 1903 declared that immediate delivery was the best treatment. Even in 1911 this was the standard therapy in all teaching influenced by the German school. In 1912 Freund stated that in default of better treatment (not because we are satisfied with the results) we hold to early delivery. This was followed by an article from Leipsic noting remarkable results with the therapy of delay, and one from Dortmund which counseled the therapy of the middle line. Immediate delivery still gave in the best statistics from 3 to 4 per cent of deaths, and was not considered the therapy of choice, particularly in the light of the excellent results obtained in France with conservative measures, especially venesection, Bar and Commandeur noting the renaissance of venesection as the most important development in clinics outside the German influence. Engelmann notes as his therapy venesection with delivery in the usual manner as soon as this is possible without special danger to the patient. In 118 cases he had a maternal mortality of 6.7 per cent, and fetal 9.4 per cent, where the weight was over 2000 grams. In 1917 Freund noted diminished maternal but increased fetal mortality by conservative methods. Two years later Freund again reported that the results had not come up to expectations, but that immediate delivery was not indicated in every eclamptic case. To wait or to deliver must be settled in each individual case. In the meantime Bumm's clinic had given up its earlier stand on immediate delivery, probably on account of unfortunate late results. Unless the cervix was fully dilated, there was an unusually high operative mortality in immediate delivery. Possibly, too, the fetal results were better. Both conservatives and radicals up to a certain extent have given up the extreme position and come toward a more common ground.

The chief objection to conservatism was the high fetal death rate.

Engelmann claims that the results will not differ more than about 1 per cent when the middle line is taken. In fact his results have been remarkably improved by transition from active therapy to that of the middle line.

The key word of his position is individualization. Where speed is necessary, abdominal section has distinct advantages over vaginal. Every case of eclampsia exactly as placenta previa should be hospitalized as soon as possible, since each of these complications requires continuous observation and eventually handling which is only possible in a hospital.

Venesection is variable in its effects on the individual. Results will depend on the stage of the disease when treatment is begun.

Preventives are rest in bed, the minimizing of fluid and of salt, venesection, diruetics, chloral, and eventually delivery. Engelmann believes that rupture of the membranes and possibly a forceps delivery is the best method, and believes that the decreased pressure due to emptying the uterus is of the greatest importance. As for chloral, he believes it to be almost specific in treatment, since in addition to its narcotic effect, it possesses the possibility of decreasing temperature and blood pressure, especially when given intravenously.

Contrary to Zangemeister, Engelmann believes in diuretics, particularly purin derivatives. As to infusions there is some difference of

opinion, some holding that, inasmuch as there is retention of fluid in eclampsia, they should not be given. On the other hand, the influence of infusions on diuresis is well known. It is possible that infusions of Ringer's solution may be of value.

Engelmann warns, as does Zangemeister, against forced diaphoresis in all stages of eclampsia. He is doubtful of the worth of decapsulation of the kidney and of lumbar puncture. He draws attention to the known decrease in eclampsia during the years when fat was obtained with difficulty.   H. M. LITTLE.

Brindeau: Decapsulation of the Kidneys in Eclampsia. Gynécologie et Obstétrique, 1921, iii, 275.

The results obtained by renal decapsulation in the treatment of nephritis are sufficiently encouraging to warrant the resumption of the study of this operation in relation to the therapy of puerperal eclampsia of nephritic origin.

At present the indications seem limited to those cases of eclampsia secondary to nephritis which cause a postpartum anuria, that has resisted all other treatment for twenty-four hours. One would better wait until after delivery before considering decapsulation because the delivery often relieves the kidney congestion.

The operation consists of exposing the kidney by the classical lumbar incision, splitting the fibrous capsule along the convex border of the kidney and decapsulating to the region of the hilum. The wound is closed with a wick drainage. Most surgeons advise decapsulation of both kidneys.   R. T. LaVake.

Lübbert: Kidney Decapsulation in Two Cases of Postpartum Eclampsia. Muenchener medizinische Wochenschrift, 1920, lxvii, 1385.

On the theory that failure of the excretory organs to pass off the too rapidly accumulating toxins of pregnancy leads to eclampsia, the kidney becomes the keystone in the treatment of this condition, where convulsions first appear after the uterus has been emptied. Two cases are cited where stripping off the kidney capsule resulted in cessation of convulsions and complete recovery.

Decapsulation in this condition is indicated by the appearance of convulsions after the uterus has been emptied and by an accompanying anuria.   S. B. SOLHAUG.

Gessner: Increased Blood Pressure in Eclampsia. Zentralblatt für Gynäkologie, 1921, xlv, 847.

The author distinguishes between idiopathic hypertonus in pregnancy based, he believes, on hypersecretion of the adrenals, and possibly due to increased abdominal pressure, and the hypertonus symptomatic of impending eclampsia. He noted a characteristic blood pressure curve in the latter, which he found in only one other condition, namely, mechanical obstruction to urinary secretion. This condition exists in some cases of enlarged prostate and has been artificially produced by injecting fluid into the bladder. That there is a certain amount of back pressure in the urinary tract during pregnancy has been shown by Weibel.

Since similar conditions do not arise from tumors of the pelvis, the

cause cannot be ascribed to direct pressure. In fact, Gessner finds that the ureters are not markedly compressed by the pregnant uterus nor the urethra by the descending head. Since the cervix and neck of the bladder are connected by muscle bundles, the bladder is drawn up by the pregnant uterus. This again pulls on the ureters and causes a spastic condition of the ureteral musculature. If the kidney is movable, no harm is done, but if the latter is fixed by an excessive amount of fat, the spastic ureters, he believes, cause an interference with its blood supply. To this tugging on the kidney, he ascribes the epigastric pain of eclampsia.

The author points out the danger of injecting salt solution after venesection and advises early ligature of the cord in order to reduce the amount of poison in the infant's blood. The latter should be given large amounts of water during the first few days of life.   W. M. LITTLE.

Nevermann: The Effect of Venesection in Eclampsia. Zentralblatt für Gynäkologie, 1921, xvii, 609.

It has been claimed that venesection causes a decrease in the total quantity of poison, as well as a decrease in the viscosity of the blood. Nevermann attempts to prove that neither of these theories is tenable. Nor does he believe that the temporary decrease in excessive blood pressure is a factor in the marked improvement following venesection. Observations made during the past year according to Weiss' method with the capillary microscope gave a clue to the manner in which improvement was obtained.

After venesection there was a decided decrease in the tension of the capillaries and increase in the capillary circulation not observed after the administration of any of the medicaments which produce similar results by lowering of blood pressure, etc. The capillary tension did not seem to be of nervous origin, but directly dependent on the amount of blood brought to the capillaries. Decrease in the volume of venous blood naturally released tension and allowed a more free circulation. Venesection has a place in pre-eclamptic toxemia.   W. M. LITTLE.

Gibson: The Sequelae and Later Aspect of the Toxic Albuminurias of Pregnancy. Surgery, Gynecology and Obstetrics, 1921, xxxii, 513.

Except in cases of undoubted chronic nephritis, Gibson thinks it futile to attempt a classification of the various forms of disturbances of pregnancy ranging from albuminuria to eclampsia. From a study of eclampsia patients who again became pregnant, he believes that a subsequent pregnancy always exposes a patient to three hazards, namely, irreparable damage to the kidneys, and heart, prematurity, and eclampsia. While a woman may be permitted to become pregnant again after an interval of normal blood pressure and freedom from evidence of kidney insufficiency, he, personally, can see no justification for placing her in jeopardy a second time.   R. E. WOBUS.

ERRATA

September, 1921, issue, page 309, in the discussion on Dr. Baer's paper:—Dr. J. C. Howe, should read Dr. Joseph C. Aub.

Correspondence

Sir:

The American Society for the Control of Cancer announces a seven days' campaign to be designated ''Cancer Week'' from October 30 to November 5. The purpose of the movement is to reach as many persons as possible in the United States and Canada, with the vital message of Cancer Control. Committees have been established in all parts of these countries; lecture bureaus, made up of interested and authoritative speakers, have been formed, and the campaign will be conducted in accordance with the enclosed plan.

Naturally the success of even so conservative a campaign depends largely upon the character and extent of the publicity given; while supplementary information from reliable sources by medical writers will be of the greatest value in creating interest and disseminating facts concerning cancer.

There is probably no preventive medicine campaign of more vital importance to all classes of people, or one which gives promise of greater interest or more hope. It is significant that the death rate from this disease has been arrested. Since 1916 it has remained practically stationary, with only minor fluctuations. This is the most encouraging thing which has happened since the Society was organized in 1913, and leads us to believe that united effort by all cooperating agencies will not only prevent a further increase in this rate, but will effect a continuous decrease.

We feel that no small part in the past attack on this insidious disease has been played by writers in medical journals and the lay press; and it is confidently hoped that you will now ''carry on'' even more determinedly the attempt to rout this, one of the last of the so far uncontrolled scourges.

Faithfully yours,

F. J. Osborne, Executive Secretary.

September 2, 1921.

Original Communications

THE DEVELOPMENT OF THE HYMEN*

By Fred J. Taussig, M.D., F.A.C.S., St. Louis, Mo.

IN 1908 in an article published in the *American Journal of Anatomy* I presented evidence based on the serial study of six embryos of 12-26 cm. body length that pointed to the origin of the hymen as a connective tissue proliferation directly back of the entrance of the vagina into the urogenital sinus. I stated at the time that I did not consider these six embryos sufficient to establish my views and that I hoped in the course of years to find some authoritative confirmation or refutation of my findings. Strange to relate, while a number of articles dealing with this subject have appeared during the past thirteen years, the evidence has as before been largely based on the study of congenital anomalies, of gross anatomic dissections and of single microscopic sections through the lower portion of the genital tract. Textbooks of embryology have in the main simply restated the time-worn theory of Nagel that the hymen was an obliteration membrane left at the point of entrance of the muellerian ducts into the urogenital sinus. The latest textbook by Prentiss-Arey (1920) again says: ''The muellerian tubercle is compressed into a disk, lined internally by the vaginal epithelium, externally by the epithelium of the urogenital sinus or future vestibule. These layers with the mesenchyme between them constitute the hymen, which thus guards the opening into the vagina.''

I have therefore felt impelled once more to take up the cudgels in

defense of my theory and try if possible definitely to settle all points concerned. All students of embryology must acknowledge that in dealing with such a minute fold as the hymen during its early stages, serial microscopic sections can alone be relied on to give the necessary information. Access to an unusually large collection of well-preserved embryos from the fourth to the sixth month of fetal life in the Anatomical Department of Washington University gave me opportunity to supplement on a larger scale my original studies. Twenty embryos varying from 15.5 to 33.5 cm. head-breech measurement were examined* and the lower urogenital tract studied in sagittal serial sections. In almost every point these investigations confirmed my former findings and their interpretation.

The Hymen in Animals.—According to Schmaltz, in pigs, horses, cattle and dogs there is a definite constriction at the junction of the vagina with the vestibule. At times this constriction has the appearance of a membrane, but the descriptions do not indicate any active connective tissue proliferation at this point, no formation of vaginal rugae or intertwining folds such as appear in certain anthropoid apes and in the human race. A similar constriction is found at the anus, the urethra or almost at any point where one duct joins another or reaches the surface. It is, however, a very different thing from the typical fold we see in certain apes and in man. Such a fold is not present in lower animals. Particularly in the American apes (Cebus) and in certain anthropoid apes such as the chimpanzee and gorilla a distinct hymeneal fold has been regularly found. The resemblance of the hymen and the genital organs in the American ape and the human race suggests that secondary retrogressions within the primary family tree may have occurred and that in this respect man may retain a more primitive form than that found in some of the anthropoid apes.

In the embryo of 3 cm. body length the muellerian ducts reach the urogenital sinus and, after coalescing, project into the lumen of the sinus as an epithelial proliferation called the muellerian eminence. Six weeks later in the 10-12 cm. embryo there occurs a bulb-like enlargement of the coaleseed ducts directly back of this eminence. This brings about a fold or membrane formation that Nagel interprets as the original hymen. Berry Hart on the basis of five embryos studied in serial section considers this bulb-like thickening as a product of the wolffian duct and hence concludes the hymen to be of wolffian origin. The careful investigations of Robert Meyer in 116 embryos studied serially definitely proves, at least to my mind, the falseness of Berry Hart's views. He found evidence of the wolffian duct as a separate, narrow duct in a large proportion of his embryos reaching all the way

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*A detailed report of the gross and microscopic findings in these embryos is reserved for later publication.

down even to the edge of the hymen. The wolffian duct cannot, therefore, form the lower vagina as Berry Hart would have us believe.

The mistake that Nagel and so many of the men who have studied the subject since his time have made has been that they failed to study what becomes of this original connective tissue fold in the course of the following six weeks. In 1875 Dohrn, who paid special attention to this stage of embryonic development, found in a study of 25 embryos of 18-26 cm. body length on cross-section with the aid only of a magnifying glass that the true hymeneal fold occurred as an independent proliferation directly behind this original occluding membrane. Let us also remember the evidence of Schaeffer who made similar cross-section studies in 170 embryos and found in many in-

Fig. 1.—Sagittal section, slightly lateral to midline, showing hymen (Hy) as a fold within the vagina (Va) and separate from the entrance into the urogenital sinus (U. S.).

stances a double fold which in my previous paper I interpreted as due to occasional persistence of the original muellerian eminence fold in addition to the true hymen.

What I mean by these two folds can best be seen by going on to a study of my own evidence. In the smallest embryo of my series (Fig. 1) one of 15.5 cm. head-breech measurement, you see the eminential fold similar to that described by Nagel, but above it lies another definite connective tissue fold or membrane that can be followed as such in my serial sections. This fold measures in its anteroposterior diameter one half millimeter. The next step is the dilation of what I have termed the "eminential fold" (the original hymen of Nagel) by an outgrowth of epithelium and connective tissue from the vagina (Fig. 2). All embryologists have been astounded at the pronounced growth impulse

that is localized at this point during this period. In the short space of six weeks the hymen increases over 20-fold in size, for in the embryo of 30 cm. body length it is 10 mm. in anteroposterior diameter and protrudes for a distance of 6 mm. out into the vestibulum. Measured along its circumference the hymen would be almost 15 mm. in greatest extent. Now let us watch step by step the manner in which this tremendous outgrowth occurs. Limited anteriorly and posteriorly by the urethra and rectum it is but natural that this growth energy should have sought the point of least resistance, namely outward through the original vaginal orifice between the labial folds and beyond. I wish to call especial attention to the following points:
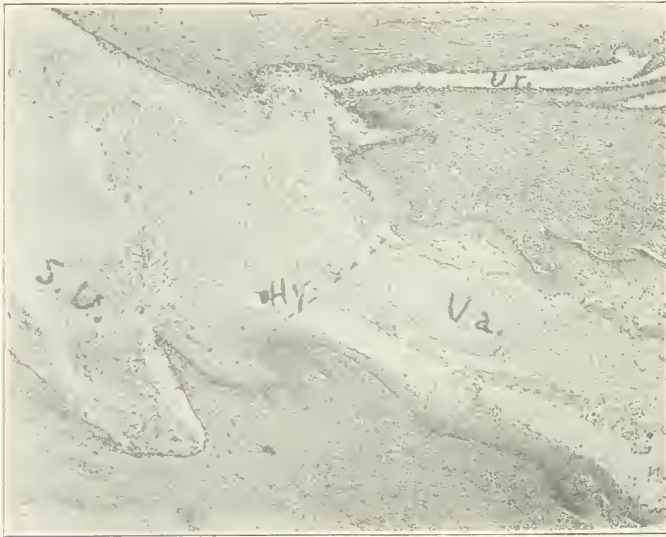
Fig. 2. Sagittal mesial section embryo (16 cm. head-breech) showing edge of hymeneal ring inside the vagina. The muellerian eminential fold lies between it and the urogenital sinus (S. U.).

(1) In the earlier stages there is still a definite ring of the original eminential fold left at the margins of the hymen.

(2) The outgrowth is an actively proliferating process sending papillae in all directions, not a passively formed membrane due to epithelial enlargement at the end of the vagina as Nagel and other embryologists have stated.

(3) The outgrowing hymeneal fold is lined on both sides by typical vaginal epithelium (Fig. 3). Only in that portion of the hymen that juts far out beyond the labia do we note a beginning change resembling vulvar epithelium. In the hymen of the newborn this change to an epithelium resembling vulvar epithelium has become more pronounced over the entire outside of the hymen. It is because many have examined only the early stages of Nagel and the fully developed hymen of the new-

born that the original theories concerning its origin have so long held
their ground.   (Figs. 4-7.)

So much for my embryological evidence. What I have said against
the value of anomalies of development in solving the hymen problem
applies only to their value in *establishing* a theory. In the last analysis
all studies of development must be based primarily on embryologic
evidence but anomalies may well be used as evidence *in rebuttal*
against any theory. Let us for a minute see how our theory will hold
against such evidence *in rebuttal*. Pozzi, Küstner, Blair Bell and others
have noted the following anomalies:

(1) Hymen present in complete atresia of vagina and uterus.

(2) Hymeneal fold around the urethra or vestibulum.

Fig. 3.—Sagittal mesial section, embryo (20.5 cm. head-breech) showing outgrowth of
vaginal tissue forming the hymen through the muellerian eminential fold. The edge of this
fold can still be recognized by its covering of vulvar epithelium at the lower half of the
hymen. The hymen proper is covered on both sides by vaginal epithelium.

(3) Absence of hymen in presence of normal vagina and uterus.

(4) Single hymen with double vagina.

In the last mentioned instance an incomplete vaginal septum may
explain the apparent singleness of the fold, particularly as we find
double hymen with double vagina much oftener.

The other three anomalies, however, can hardly be explained if we
accept the hymen as an essential part of the early developmental
processes at the muellerian eminence If, however, we accept my view
that the hymen is a more or less independent mesodermal proliferation
occurring at a later stage in the development of the vagina, then it
would naturally follow that this mesodermal impulse might at times be
misdirected and show itself as a urethral or vulvar fold outside its

normal position behind the muellerian eminence. Such a fold forma-
tion would to a certain degree be independent of the development of
the vaginal tract, so that even in complete atresia of the vagina, a
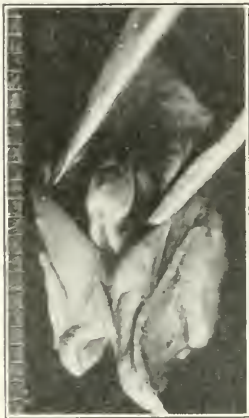
Fig. 4.—External genitals of embryo,
15.5 cm. body length (same as Fig. 1).
Labia majora separated, clitoris and labia
minora visible but no external evidence
of hymen.
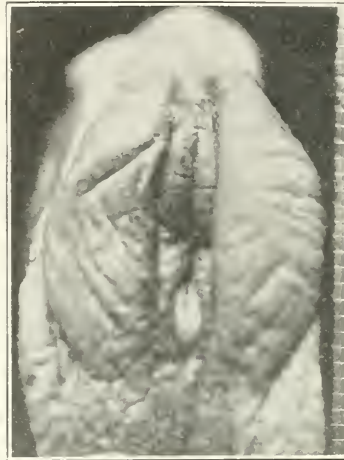
Fig. 5.—External genitals of embryo
28 cm. body length, with prow-like pro-
jection of hymen (white) between labia.

Fig. 6.—External genitals of embryo
24 cm. body length with labia minora
separated showing a typical septate hymen.

Fig. 7.—External genitals of embryo
23 cm. body length, showing typical fim-
briate hymen.

fairly well defined hymen might be present and, on the other hand, in
an arrest of development of the fold, we might have a normally formed
genital tract with an absence of the hymen.

Even more interesting is the application of this view of the devel-

opment of the hymen to the interpretation of so-called hymeneal atresia. It has long been a puzzle how one little portion of the genital tract could become atresic and the remainder be fully developed and functionating. I refer now to the cases with normal onset of menstruation and the formation of a hematocolpos behind the occluding membrane. Nagel, Veit and others who held fast to the formation of the hymeneal membrane out of the muellerian eminential fold were convinced that such a localized vaginal atresia was embryologically unthinkable and sought to explain this phenomenon by some change in postfetal life. Infectious processes in the vagina of the newborn, more especially gonorrheal vaginitis, was thought to be the agent in formation of this obliterating membrane. This has seemed far-fetched to many. Why we should have agglutination of vaginal folds only at the vaginal orifice and not further inward as well, if it were due to a gonorrheal infection, is hard to understand. Furthermore well-defined hymeneal atresia with normal genital tract has been observed *at birth*. The most direct explanation of hymeneal atresia is to consider such a hymen not as *imperforate* but as *occluded*. Kermauner thus explains its formation: "Finally the closed hymeneal membrane is nothing more or less than an expression of excessive growth in the mesoderm. We can explain the origin of such deformities as an excessive growth, a sort of local giant-growth on a small scale." Blair Bell noticed particularly that the hymen in these cases "appeared to be irregularly attached to the surface of the obstructing membrane forming strands up to the periphery where it was tougher." His observations of such atresias and anomalous positions of the hymen outside of the vagina led him to support Pozzi's theory of the hymen as of vulvar origin. I agree with him that such observations point to the hymen as an active outgrowth of mesodermal tissue but I trust that the evidence I have presented tonight will convince him that *normally* the point where this outgrowth occurs is not in the vulva but in the vagina directly back of the eminential fold.

And now, most interesting of all, what is the purpose of this strange little structure, found only in certain apes and in the human race. Back of it must lie some story in our evolution that is well worth knowing more about. Its early pronounced fetal development points to its ontologic importance. Friedenthal has suggested that the purpose of the hymen may have been to protect the vagina from urine. To this I would object; (1) that urine is not irritating to the vagina unless it is retained there in a pocket; and (2) that only in an animal with the urethra above the vagina would there be such contamination. In the standing posture there is no appreciable greater contamination of the vagina with urine than in animals on all fours.

Klaatsch's theory is that in some way the hymen must have had to

do with the manner of sexual intercourse of our progenitors. It may be true that such a hymeneal fold is less of an obstruction when relations are had from behind than in the normal human way but even so it is an obstruction rather than a guide as Klaatsch would have us believe. Certainly the many other lower animals who practice coitus from behind have not needed such a membrane. I do not see anything to justify such a theory.

To me the answer to this problem must be sought somewhere in the changes occurring in the transformation of the four-legged into the two-legged animal. Going hand in hand with these changes to the erect posture are those in the internal genital tract by which through the shortening of the vestibulum the vagina comes nearer to the surface. It is worthy of note that those American apes whose vagina is nearest to the outside have the best developed hymen. Now it is reasonably certain that our progenitors squatted on the ground far more than we. It must have taken a considerable period of time for the hind legs to have developed sufficiently to hold the body weight without tiring. We still see racial tendencies to such a squatting habit among the Arabs and other tribes. The young baby goes through such a period of squatting. If we now picture a vagina that lies nearer the surface than in lower animals the squatting posture must have given rise to contamination with insects and irritating substances from the ground unless Nature had taken some means to offer protection. The usual conception of the labial folds is that they have such a protecting function and it does not seem unreasonable to suppose that the hymen similarly and in a more direct manner served to keep out foreign material from the vagina. Particularly during the first years of life before the labia and their hairy covering are fully developed would such a hymeneal fold serve a definite purpose. According to this view, then, the hymen dates back to the time when the progenitors of the human race squatted on the ground.

4056 MARYLAND AVENUE.

HEMORRHAGE FROM THE NONPREGNANT UTERUS IN THE ABSENCE OF A NEOPLASM*

By W. A. Scott, B.A., M.B., F.A.C.S., Toronto, Ont.

A GREAT variety of terms have been used to describe the clinical phenomena of hemorrhage occurring from a nonpregnant uterus which is not the seat of a neoplasm. Climacteric hemorrhage and myopathic hemorrhage are two terms used from the clinical standpoint, whereas fibrosis uteri, chronic metritis, and arteriosclerosis of the uterus, are pathologic terms applied by other writers in the attempt to describe the clinical symptoms by a term descriptive of what they regard as the underlying pathologic condition.

The commonest of these terms in use today is fibrosis uteri, but it is one to which a great diversity of meaning is applied. Fletcher Shaw uses the term synonymously with chronic metritis and defines it as "a uterus symmetrically enlarged and hard, which contains no new growth and which produces hemorrhage, pain on leucorrhea, or any combination of these." Such a definition is a clinical, rather than a pathologic one. Furthermore, in all cases of idiopathic bleeding we do not find an enlarged or a hard uterus, some of them being small, atrophied, and of the senile type, others large and soft, large and hard, or normal in size.

The first scientific article on this subject was published by Scanzoni in 1860 and it was followed by another in 1863 in which he described two stages in the development of chronic metritis. The first stage he termed one of infiltration, with a large, soft uterus, due to hyperemia and edema and followed by a stage of induration, where the uterus was dry, hard, and anemic with vessels much reduced in caliber.

Seifert in 1866 and Saxinger in 1867 came to the conclusion that the bleeding was the result of subinvolution, while Finn asserted that the chief pathologic change was a hypertrophy of the muscle and the increase in fibrous tissue was negligible. Since that time there has been much debate whether the increase in size of these uteri was due to muscle alone, to muscle and connective tissue, or to connective tissue alone.

In 1870, curettage, as a treatment for hemorrhage, came into vogue and Olhausen placed the chief blame for the bleeding on the endometrium and septic endometritis came to be looked upon as the only

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cause for metritis. This idea inevitably led to the idea of chronic endometritis which persisted until the work of Hitschman and Adler in 1908 disproved the occurrence of chronic endometritis except in very rare instances.

Fritsch, Cornil, Pozzi and Reinicke all published articles between 1885 and 1897 without making any great contribution but in 1902 Theilhaber and Meier elaborated the theory of "muscular insufficiency" and at the same time contended that any change in the endometrium was secondary to that of the myometrium.

Barbour came to the conclusion that the main pathologic change was one of arteriosclerosis, although he pointed out that such a condition after the menopause is seldom, if ever, accompanied by serious hemorrhage. Hermann, Martin, and Rustner all agreed with this view, but Palmer Findlay, in 1905, disagreed and went back to the idea of muscular insufficiency. He held that the common cause of this muscular insufficiency is the increase of connective tissue at the expense of muscle, a fibrosis uteri, and that the most important precursor of this change is passive congestion of the uterus from any cause. He also taught that a hyperplasia of the endometrium was secondary to a primary metritis. Addinsell in 1906 contended that there were three stages in the process: infiltration of both endometrium and musculature, then an intermuscular fibrosis, and finally a degeneration of this fibrous overgrowth. In the same year Gardiner and Goodall published a comprehensive report in which they stated that any prolonged congestion causes hypertrophy or hyperplasia of muscular as well as connective tissue and if this is sufficiently prolonged the muscle fibers atrophy and the connective tissue predominates.

Archibald Donald in 1907 opposed the idea that the changes were due to passive congestion and pointed out that the vascular changes are inconstant. He believed that the changes in the endometrium are constant and that hypertrophy of this mucous membrane causes a work hypertrophy of the musculature. In 1910 Goodall published another paper on "Climacteric Hemorrhage" in which he pointed out that the areas of so-called hyaline degeneration around the blood vessels, described by previous writers, if stained by Weigert's method, would prove to be elastic tissue and he believed that the causative factor was subinvolution of the uterus. He did not believe that infection alone, apart from pregnancy, could give rise to chronic metritis. In the same year Rabinovitz stated that the blood vessel changes are secondary to those of the muscularis; as proved by invasion of fibrous tissue in the adventitia. He believed that the cause of the condition is the fact that connective tissue does not undergo retrograde changes as fast as the muscular tissue after pregnancy.

Briggs and Hendry studied 104 uteri removed for uncontrollable

hemorrhage cases and in their opinion the muscular changes can be either the result of subinvolution or of hypertrophy. They could not demonstrate any constant increase in the amount of elastic tissue and found great variations in size, number, and distribution of the vessels. Their view was that uncontrollable uterine hemorrhage is a functional disturbance.

Fletcher Shaw has possibly written more on the subject of chronic metritis than any one else. He published papers in 1907 and 1914 on its pathology and his views were summed up in his excellent article in *The New System of Gynecology* edited by Eden and Lockyear and published in 1917. He found no constant blood vessel changes and concluded that the hemorrhage is not dependent upon such changes, but he also pointed out that the increase in the size and thickness of the uterine wall is a constant feature and is due to an increase of both muscle and connective tissue. The endometrium was found to be fairly constantly thickened. Shaw confined his study to uteri symmetrically enlarged and hard, most of which were the site of hemorrhage, but in a few of which the symptoms were leucorrhea or pain. He studied, therefore, a definite uterine change rather than the broader question of idiopathic hemorrhage, for we know that the latter may occur from uteri that are not enlarged and are not hard. He divides the cases studied into three groups: (1) Chronic metritis, meaning the late result of inflammation and comprising 1 per cent of the total. (2) A subinvolution group, comprising 95 per cent of the total and (3) a hypertrophy group, comprising 4 per cent of the total. In both the subinvolution and hypertrophy types the endometrium was thickened and the glands dilated and he describes the hypertrophy cases as due to the efforts of the uterus to expel this thickened mucosa.

E. H. Macdonald considered that essential uterine hemorrhage is an abnormality of menstruation and conceives of the latter as being due to an inhibition and then a contraction of the uterine musculature.

Novak, in 1917, and again in 1920, published very suggestive papers on ''Hyperplasias of the Endometrium,'' in which he pointed out that there is much evidence in favor of the explanation of abnormal uterine bleeding being a perverted physiology of the menstrual mechanism. He pointed out that in these cases of functional bleeding a very common histological finding is a glandular hyperplasia of the endometrium. Novak stated that in his experience this condition of the endometrium is never found except when uterine bleeding has been a symptom, but it may be associated with other lesions that are in themselves producers of abnormal bleeding, such as fibroids. He thinks that a common factor, likely ovarian, accounts for both the bleeding and the hyperplasia.

Geist in his study of hemorrhage from the myomatous uterus as well

as from the uterus free from neoplasms, comes to the conclusion that the bleeding is purely functional and brings forward evidence that the causative factor is likely ovarian.

From the above summary of the literature it is obvious that the histological findings in cases of idiopathic uterine bleeding vary in the experiences of different observers and there is no one constant finding: also that most writers are agreed that the majority of the
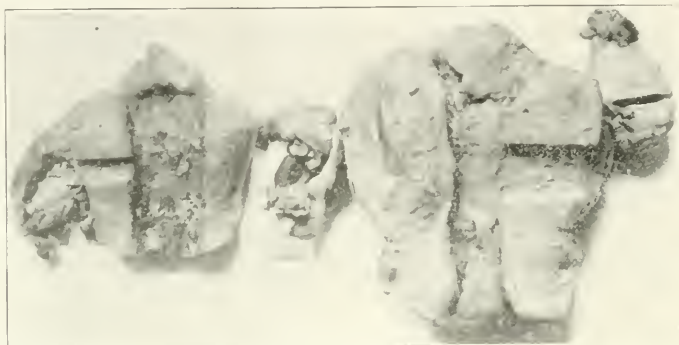
Fig. 1. Photograph of two bleeding uteri taken side by side for comparison of size. Symptoms the same.

Fig. 2. Photograph of two bleeding uteri taken side by side for comparison. The smaller uterus was so fibrotic it cracked from the pressure of a uterus holder used during operation.

cases are of the subinvolution type so well described by Goodall, in which the uterus is enlarged with a very thick wall and with both the muscular and fibrous tissue increased, although the relative proportion of these two tissues is about normal. The blood vessels are thick walled and there are large plaques of elastic tissue around many of them, the result of subinvolution. Most of the uteri that have been carefully studied histologically have been of this type, and having

made out these findings, it has been assumed that the bleeding depends
upon them. But idiopathic bleeding also occurs from other types of
uteri and it is not uncommon to find the small sclerotic uterus, or the
large, soft and flabby one, bleeding just as profusely as the one that is
typical of the so-called "fibrosis uteri." Moreover, it is possible to
find many uteri exhibiting any or all of the described histological find-
ings and yet not the seat of abnormal bleeding.

The series of cases that form the basis of this paper consisted of 126
specimens, all of which were stained by Weigert's method for elastic
tissue and counterstained by Van Gieson's method for fibrous and mus-
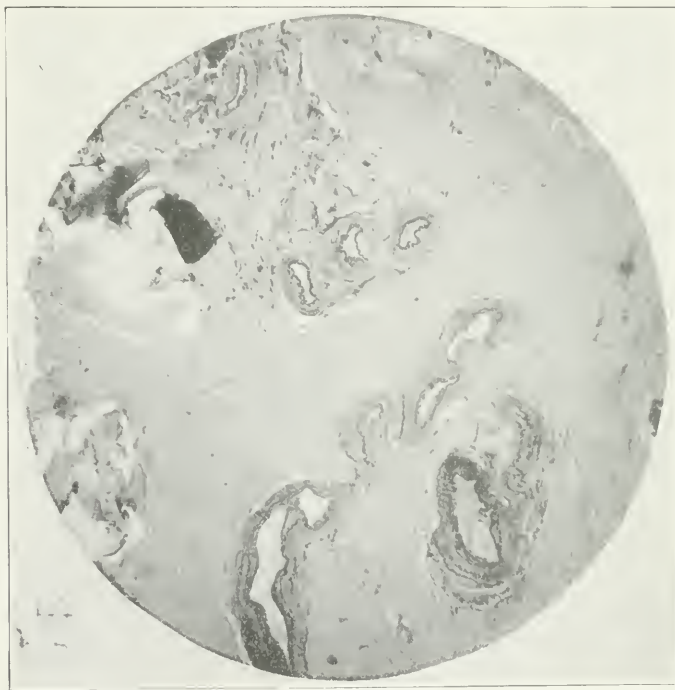
Fig. 3.—Section from wall of uterus that was bleeding excessively. Patient's age 48.
Para vi. Uterus enlarged with thick walls. Vessels are enlarged and thick-walled and contain
an excessive amount of elastic tissue.

cular tissues. Of the total number, 92 were the seat of idiopathic
bleeding and 34 were either not bleeding at all or were having normal
menstruation. Let us consider the bleeding cases. Of these, 62 had
the gross characteristics of the so-called fibrosis uteri. The walls were
much thicker than normal and the blood vessels stood out from the cut
surface as firm projections. Each uterus was considerably enlarged,
was very firm in consistency, and the myometrium was streaked and
mottled by what appeared to be strands of fibrous tissue. But there
were also 16 of the bleeding cases in which the uterus was smaller than
normal but firm in consistency. Finally there were 14 cases in which

the uterus was normal in size. Fig. 1 is a photograph of one of the large and one of the small uteri taken side by side for comparison. Fig. 2 is a similar case where the small uterus was so fibrous that the pressure of a uterus holder, used during the operation, was sufficient to crack the wall.

Not only are the gross appearances inconstant in these cases of bleeding, but the microscopic findings also vary greatly. The estimation of the normal proportions of fibrous tissue and of muscle in the wall of the uterus is a matter of individual judgment, but these specimens were stained to bring out the two tissues sharply, and in my estima-

Fig. 4.—Section from the wall of an enlarged, hard uterus removed for prolapse. Menstruation was normal and there was no evidence of pelvic inflammation. Patient's age 34, para ix. Vessels are very thick-walled and contain an excess of elastic tissue. Microscopical findings are those of "fibrosis uteri," yet there was no bleeding.

tion, out of the 92 bleeding cases, there was an increase in the proportion of fibrous tissue in the uterine wall in 34 cases, while there was less than the normal proportion in 2, and in the remaining 56 cases the proportions of muscle and connective tissue were normal. The appearance of the blood vessels was also inconstant. They were markedly thickened in 24 specimens, though the situation of these thickened vessels varied, in some instances being just under the mucosa and in others being found only in the deeper parts of the myometrium. In 34 specimens of bleeding uteri the vessels contained an excessive amount of elastic tissue or had masses of this tissue out-

side their walls, while the remaining 56 cases had vessels microscopically normal.

In view of the inconstant gross and microscopic findings in these cases of idiopathic bleeding, it appears improbable that the bleeding is actually caused by any one of these changes in either myometrium or vessels. This opinion is strengthened by a consideration of the 34 cases studied where the uterus was not the seat of excessive bleeding but was removed in the course of operation for prolapse or inflammatory disease. In this group 18 specimens were larger than normal, 6 specimens were smaller than normal and 10 were of normal size.
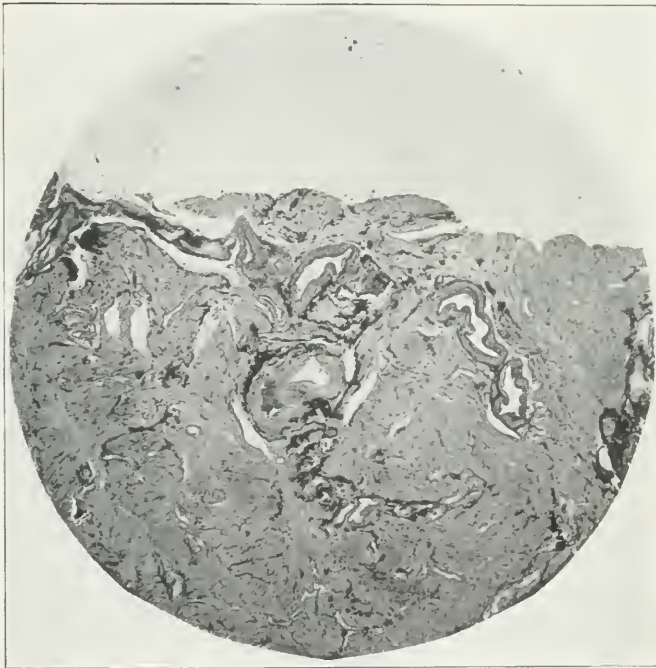
Fig. 5.—Same specimen as Fig. 4. Further illustration of the findings of "fibrosis uteri" without bleeding.

The microscopic findings varied as much as in the bleeding cases. There was an increase in the proportion of fibrous tissue in 20 cases and the proportion was normal in 14. The blood vessels were thickened in 24 specimens while in 16 they contained an abnormal amount of elastic tissue, either in the wall or just outside the wall. The vessels were normal in 8 instances.

We see then, that the histological findings of chronic metritis or fibrosis uteri, are not present in all cases of idiopathic uterine hemorrhage but, on the other hand, are found in a fair proportion of cases where there is no abnormal bleeding. This is illustrated by Fig. 3, which shows a section of wall from a large, hard, bleeding uterus, and

Figs. 4 and 5, which are sections from the wall of an enlarged uterus that had never shown any excessive or irregular bleeding. In both cases there are thick-walled blood vessels containing excessive amounts of elastic tissue, yet one uterus was bleeding excessively, the other was not. Fig. 6 shows a normal myometrium and normal vessels from a uterus that had severe and irregular bleeding. Fig. 7 shows a uterus that was very hard, smaller than normal, and had a myometrium containing a very large proportion of fibrous tissue but without any excessive bleeding. Fig. 8 shows these results in tabular form.

There was one histologic finding, however, that was more constantly
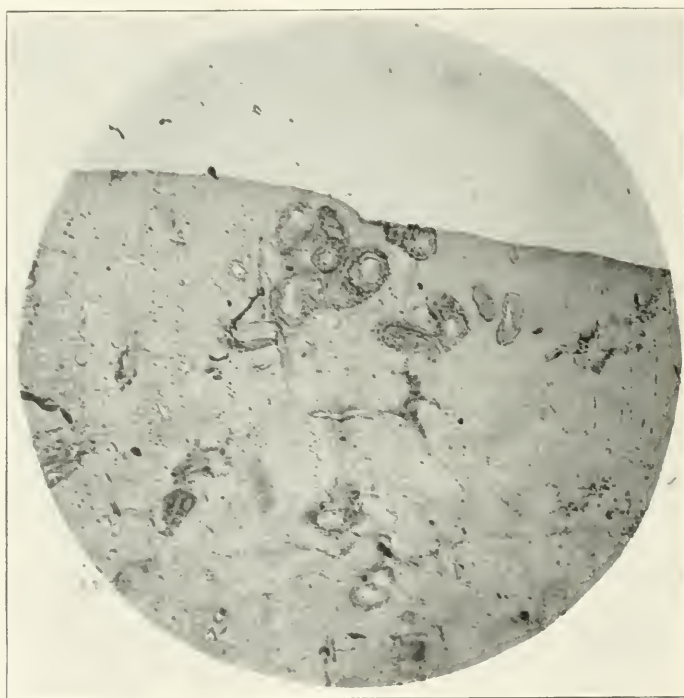
Fig. 6.—Normal vessels and myometrium from a normal sized uterus that was the site of very severe hemorrhage.

present in the bleeding cases than any other and that was a glandular hyperplasia of the endometrium. In the great majority of these cases the endometrium was much thicker than normal, though this is not always true. The glands are greatly increased in size and in number and large glands are often present just under the epithelium. Usually the stroma is also increased in amount and very cellular, but in other cases the picture is almost wholly one of glandular overgrowth with the appearance of an exaggerated, premenstrual activity. This condition is not found in all bleeding cases, but is present in a large proportion, 64 out of the 92 bleeding specimens examined showing it. I have yet to find a typical case of hyperplasia of the endometrium

unaccompanied by bleeding and, as Novak has pointed out, it is frequently found in cases of a neoplasm, such as a fibroid or an adenomyoma, if the patient is suffering from bleeding.

If, then, there be no constant histologic findings in cases of idiopathic uterine hemorrhage, and the bleeding does not depend upon changes in the myometrium or in vessels, how is it to be accounted for? In the absence of positive proof of its causation there are certain considerations that point to its being due to some aberration of the endocrine glands. In the first place, idiopathic hemorrhage occurs

Fig. 7.—Section from wall of uterus smaller than normal and very hard. No irregular bleeding. Age 38, para iii. There is great increase in the connective tissue and the vessel changes are those of subinvolution.

only during the menstrual life of the patient and practically always starts as a menorrhagia, though it may develop into a metrorrhagia. Secondly, it occurs most frequently near the time of puberty or the menopause, and this is also the time when the action of the endocrine glands is most frequently abnormal. Thirdly, the condition sometimes clears up spontaneously and a normal menopause or menstrual history follows. Fourthly, certain ovarian conditions, such as lutein cysts, are commonly associated with both bleeding and glandular hyperplasia of the endometrium. Finally, the condition can be cured by x-ray or radium therapy, and the action of these substances is primarily on the ovaries.

Treatment, however, must be directed against the bleeding uterus, rather than the underlying endocrine disturbance. At least this is so during the present state of our knowledge regarding endocrine therapy. There are two methods of treatment that today yield satisfactory results; one is surgery, and the other is the employment of the x-ray or of radium. Proper surgical treatment consists of a subtotal hysterectomy, after the possibility of cancer of the body of the uterus has been eliminated. A few of these cases recover after repeated curettage, but their number is so small that such a form of treatment is not advisable. More and more, however, is the use of the x-ray, or radium coming into prominence in the treatment of these cases. The use of these measures demands a preliminary curettage to eliminate the possibility of cancer, but once that is done, they can safely be treated by the use of either of these substances, with almost certainty of cure in every case.

	92 BLEEDING CASES	PER CENT	34 NONBLEEDING CASES	PER CENT
Large Uteri	62	67.3	18	52.9
Small Uteri	16	17.3	6	17.6
Normal Size	14	15.2	10	29.4
Increase in fibrous tissue	34	36.9	20	58.8
Normal fibrous tissue	56	60.8	14	41.8
Less than normal	2	2.1	0	0
Thick-walled vessels	24	26.0	24	70.5
Normal vessels	56	60.8	8	23.5
Excessive elastic tissue	34	36.9	16	47.0

Fig. 8.

To summarize, therefore, the above points:

1. The histologic findings in cases of idiopathic uterine hemorrhage are not constant.

2. In the majority of cases, the uterus is enlarged, hard, and thick-walled, and contains an excessive amount of elastic tissue: the result of subinvolution.

3. But bleeding does occur in some instances, from uteri which do not show the gross or microscopic findings of subinvolution.

4. Not only may bleeding occur without these findings, but furthermore, the histologic picture of fibrosis uteri may be present without any abnormal bleeding.

5. The most constant histologic finding in bleeding cases, is one of glandular hyperplasia of the endometrium.

6. This glandular hypertrophy and the bleeding are likely due to a common factor, which is probably ovarian.

7. Treatment is preferably by means of x-ray or radium.

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75 BLOOR STREET EAST.

OVULATION AND MENSTRUATION AS POSTOPERATIVE CONSIDERATIONS*

BY THOMAS J. WATKINS, M.D., F.A.C.S., CHICAGO, ILLINOIS

T IS not my purpose to discuss this subject in detail as it has been well done by others, especially by our Fellows, Graves[1] and Richardson,[2] but it is my intent to consider some practical features based chiefly upon personal observation.

Ovulation and menstruation as postoperative considerations are important because many of the pelvic operations affect these functions. The great diversity of opinion which exists relative to their importance is unfortunate as it frequently affects surgical judgment and must at times result in detriment to the patient and always in confusion to the student.   The extensive studies of the endocrines which have been made and the vast amount of clinical data which has been acquired have added so much to our knowledge of the ovary that this continued state of confusion is not justified.   Much of the difficulty is attributable to carelessness in recording and utilizing clinical data and to the fact that clinical research cannot be verified by "control" cases.   The so-called "open mind to conviction" is so often mistaken for a mind of fixed opinion,—roofed, sided, and continuously calked to prevent leaks,—as to materially retard progress.   A fixed opinion fails to be interested in, to observe, or to note conditions which cannot be utilized for calking purposes.

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*Read at the Forty-sixth Annual Meeting of the American Gynecological Society, Swampscott, Mass., June 2 to 4, 1921.

OVUM AND CORPUS LUTEUM

The problem of the ovary relative to operative indications concerns the production of ova and ovarian secretion. Unanimity of opinion exists relative to conservation of the ovary when conditions obtain which are favorable to reproduction. Opinions vary much in regard to conservation of the ovary for secretion. The ovarian secretion during menstrual life has been proved to be an important part of the endocrine system. The physical changes that take place in the body at puberty and the menopause emphasize the importance of ovarian function. The usual good health which obtains after the menopause is completely established demonstrates the ability of the endocrine glands to compensate for the loss of ovarian secretion. Is there any objection to the production of a premature menopause exclusive of the possibilities of reproduction? The individual most concerned, woman, would generally answer in the affirmative. This opinion for psychologic reasons, aside from other considerations, demands recognition. It is impossible to estimate the relative severity of the neuroses of the artificial and natural menopause because "control" investigation is not possible, and because individual cases vary so much. My personal observations induce me to believe that the difference is negligible.

The problem of atrophy following the menopause is the one of greatest biological importance. Atrophy following the artificial is no more than after the natural menopause, but the latter is beyond our control. More or less atrophy necessarily follows loss of ovarian function, as growth and sustained growth require function. The loss of one lessens the other. Loss of the ovarian function necessarily causes atrophy in the tissues associated with it in function. Cases are occasionally seen of such extensive postclimacteric atrophy as to cause great physical discomfort and distress from fissures, erosions and irritating leucorrhea. Although the severe cases are infrequent, the others are of sufficient importance to demand serious consideration.

CONSERVATION OF THE OVARY IN UTERINE FIBROIDS

No clinical or theoretical evidence indicates that excision of the fibroid uterus compromises the life or function of the ovaries unless they are so situated that the operation disturbs their blood or nerve supply. The menopause symptoms following hysterectomy with conservation of the ovaries, appear about the usual time. The ovaries also remain normal in size, determined by conjoined palpation. These observations are based upon an experience extending over some years of leaving the ovaries in favorable cases when excising the fibroid uterus.

We have had no instances that raised the suspicion of an increased liability of such ovaries to disease. I have no personal record of ovarian cysts developed in ovaries left after fibroid operations. It is reasonable that they should occur, but it has not been my experience to see them.

Observations in the treatment of small uterine fibroids with radium has induced us to generally limit the use of radium to cases past forty years of age; in younger women supravaginal hysterectomy has seemed preferable to destruction of the ovary by radium. The fact that with radium profuse bleeding occasionally occurs before amenorrhea is established, and that cessation of menses and arrest of growth is often temporary in younger women, is additional evidence in favor of supravaginal hysterectomy in such cases.

CONSERVATION OF THE OVARY IN SALPINGITIS

The same evidence for and against conservation of the ovary in fibroids is applicable in case of salpingitis, except in salpingitis the cortex of the ovary is modified by inflammatory reaction. We have followed other surgeons in a gradual change from radicalism to conservatism of the ovary in salpingitis, as the importance of the functional value of the ovary has been developed. This experience has convinced us that sufficient ovarian structure can and usually should be left to conserve ovarian secretion. In the very severe cases of infection enough ovarian stroma is fortunately at times left incorporated in adhesions to functionate. Authentic cases are on record of the occurrence of pregnancy in such cases. Acute ovaritis, that occasionally follows salpingectomy, may result in considerable distress, may persist for some weeks, but will generally subside and cause no further trouble if treated with time, patience and encouragement.

Tradition and some other influences have developed very different surgical judgment for the male and female sex glands, although their function and diseases are somewhat similar. Enlarged prostates and uterine fibroids are analogous structures. Gonorrheal infection, pus tubes and sex gland contamination appear in man and woman. The sex discrimination in the surgical treatment of these diseases does not appear justified.

The following case illustrates the sex discrimination which exists even among the laity:

A husband and wife recently requested the operation of removal of the ovaries to prevent pregnancy. They were informed that sterility could be easily and safely obtained by a minor operation upon the husband. They were anxious to have the ovaries removed, but refused any operation upon the husband. There is a suspicion that our profes-

sion is not entirely devoid of this sex discrimination. Excision of the testes for enlarged prostate was never a popular operation. I recall a few instances of this operation performed on nonmedical men.

NONCONSERVATION OF MENSTRUATION

Conservation of menstruation has no value aside from its relation to reproduction. Menstruation is a handicap Nature seems to have been obliged to impose upon woman for the accomplishment of pregnancy. It is part of the means of recovery of the uterus from the sorrow over the loss of the ovum. Menstruation is a menace to health and hygiene except for the purpose of reproduction. Absence of symptoms during the physiologic amenorrhea of pregnancy and lactation, and after amenorrhea following hysterectomy when normal ovaries are present, proves that menstruation has no functional value except in relation to reproduction. The handicap varies much, depending upon the amount of loss of blood and of systemic and pelvic distress. There is abundant clinical evidence that absence of menstruation, after removal of the body of the uterus, does not compromise the life or function of the ovary.

Experience has convinced me that menstruation should be abolished by excision of the body of the uterus in the course of abdominal pelvic operations when conditions obtain which make pregnancy impossible or inadvisable.

Our records show that operations for retrodisplacement of the uterus have become infrequent, generally not more than two or three a year. The uncomplicated cases are usually not operated; the operated cases generally have enough pathology to indicate supravaginal hysterectomy. Suspension of a heavy hyperplastic denuded uterus, especially if accomplished by menstrual disturbances, usually gives unsatisfactory results and not uncommonly necessitates subsequent abdominal section, which is always distressing to the patient, disappointing to the operator, and discrediting to surgery.

An abdominal section, that sacrifices by hysterectomy a poor chance for pregnancy, is preferable to one not sufficiently radical to give good assurance of cure. This type of cases demands that the operator have the clinical history well in mind at the time of operation, as individual surgical judgment is obligatory.

Conservation of menstruation should not be considered in fibroid tumors except in rare instances. My records of myomectomies have been very disappointing, menstrual disturbances have generally recurred, fibroids have often developed and most of them have required subsequent excision or radium. This result would be expected, as myomectomy does not remove the cause of the growth or the place of development, and is generally an incomplete operation. I question its

justification without advising the patient of the probabilities in prognosis.

There is a small group of women, a rather distinct type, that reminds one of Lincoln's Mississippi River boat. This boat was so badly constructed, that when it blew its whistle the boat stopped; when the boat was running it could not blow its whistle. This small group above referred to are so delicately constructed, that when they menstruate they are otherwise entirely incapacitated. They are the type of women for whom Battey[3] devised his operation of removal of normal ovaries and tubes to abolish menstruation. If supravaginal hysterectomy had been developed in Battey's time, he would have excised the whistle instead of the generator, and his operation would have lived and flourished. When this type of woman has a condition indicating abdominal section, menstruation should be abolished by excision of the body of the uterus. I refer especially to a group of cases who suffer from headaches, nausea, vomiting, pelvic pain or hemorrhage, or a composite of all these, and who are free from menstrual disturbances for only one or two weeks each month.

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104 South Michigan Avenue.

RADICAL CONSERVATISM IN THE SURGICAL TREATMENT OF CHRONIC ADNEXAL DISEASE*

By Frederick C. Holden, M.D., New York. N. Y.

CONTRARY to the usual custom of a quarter of a century ago, the present practice is for the conservation of ovarian function whenever possible. Too frequently this desire has been fraught with disaster, necessitating a subsequent operation on account of cystic and painful ovarian tissue. If ovaries are to be conserved and functionate and not cause distress, it is important that adequate afferent and efferent circulation be maintained. The removal of a normal or slightly inflamed tube may be accomplished with little interference with the circulation of the ovary, but it is impossible to remove a grossly enlarged tube, without interfering with that circulation.

It was with this idea in mind, that the operation about to be described has been performed on twelve patients, between November 22, 1919, and November 17, 1920, on the Gynecological Service of Bellevue

Hospital. This is a preliminary report, as the number is too small and the elapsed time too short, to permit of positive conclusions. The average age was twenty-three years and eight months, oldest twenty-nine, youngest twenty. All had normal temperatures and normal leucocytic counts for at least three weeks prior to operation and were suffering from the usual symptoms of chronic pelvic inflammatory disease, which
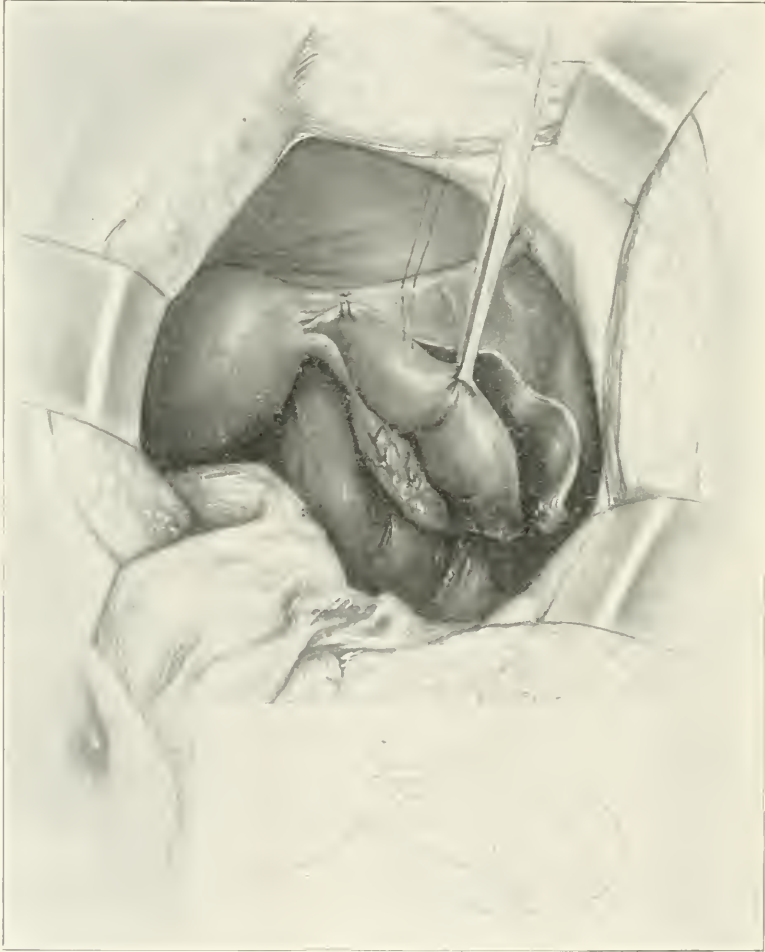
Fig. 1.

a rest period and local treatment had failed to relieve and which demanded operation for the relief of symptoms.

As to the operation itself, after severing adhesions, the inflammatory mass is brought into view, and is inspected to determine to what extent the diseased tissue shall be retained. Where one tube or ovary is apparently normal, and the other side the seat of a pyosalpinx, the diseased tube and the ovary are removed. There seems to be no justi-

fication for the retention of adnexa which are the seat of tuboovarian
abscess.

The operation consists in the incision of the pyosalpinx along its an-
terior surface, from the clubbed end to the uterine cornua, which is
best done with a sharp pointed, straight scissors. After a culture
specimen is taken, the tube is wrapped in a hot, wet pad, while the
other side is similarly treated. The bleeding of small severed vessels
is controlled by fine suture ligatures. The incised tubes are so sus-
pended to the round ligaments by three or four interrupted fine linen
sutures, as to turn the raw surface of the incised tubes downward.
The ovaries are suspended (Pool method) by drawing the peritoneum

Fig. 2.

away from the side of pelvis and a fine linen suture is passed, uniting
it with the peritoneum of the infundibulopelvic ligament, just as it
reaches the ovary. The uterus is then suspended. The choice in this
class of cases has been the Olshausen operation. Thus it will be seen
that the retroverted uterus with its adnexa is freed, the tube or tubes
incised and all so suspended that there is no chance that they can sub-
sequently reach the culdesac.

The first case was drained through the vagina, the remainder closed without drainage. Cultures in all cases were negative. Each patient made an uneventful recovery with about the same postoperative morbidity which accompanies radical operations for similar pathologic lesions.

Follow-up Notes.—From the standpoint of postoperative care, the type of patients in this short series is obviously the very worst, inasmuch as most of them are women of the streets, and it has been impossible to alter their mode of living after leaving the hospital. All traces of three have been lost, but nine have been examined one or more times since leaving the hospital. Two have reentered the hospital after the operation with symptoms of acute exacerbation of chronic adnexal disease and which were relieved by the usual treatment for acute salpingitis. In all those examined it has been possible to palpate the conserved tubes, which were not specially tender. Five of the nine were free from pain, and four had pain of varying degree in one or both sides, which did not incapacitate them.

CONCLUSIONS

1. It has been demonstrated that pyosalpinges may be incised and suspended without mortality or excessive morbidity.

2. A young woman with chronic adnexal disease, when physically disabled, and not responding to several weeks' rest and treatment, should be offered a choice between radical operation with its surgical menopause, and conservation with its possibility of reoperation.

3. In the event of conservation of ovarian tissue being decided upon, the technic described in this paper may be of benefit.

13 EAST SIXTY-FIFTH STREET.

THE DISPOSITION OF THE UTERUS FOLLOWING SALPINGECTOMY WHERE IT IS DESIRABLE TO PRESERVE MENSTRUATION*

By Carey Culbertson, M.D., F.A.C.S., Chicago, Ill.

IT IS not desired to open the question as to the advisability of preserving menstruation, but rather to limit the contents of this paper to a discussion of the disposition of the uterus where the tubes have been removed and where it is possible to preserve some ovarian tissue. I am firmly convinced that it is an advantage to maintain menstrual function, particularly where the patient is young and has not borne children. The menstrual function is one of the features of normal health, and anything which tends to preserve normal health is desirable in the cure of pelvic disease in women.

Our present knowledge of the physiology of the uterine mucosa leads us to regard menstruation as a retrograde process, a mere bleeding out of a structure that has become edematous and highly vascularized. Inasmuch as this vascularization indicates a high stage of function on the part of a lymphoid structure such as the corpus mucosa is, we must regard the premenstrual edema as the expression of function rather than the actual hemorrhagic phase. Without ascribing to the corpus mucosa the importance of a ductless gland, we cannot say until we know more regarding the importance of specific cellular activity, that its function is of no value.

While the tubes are removed for a variety of lesions, in the great proportion of cases their removal is indicated by inflammatory disease which has destroyed them as oviducts and which is so extensive as to make it reasonably doubtful that their function can be restored by operative procedure. That this operation is indicated chiefly in young women is due to the fact that it is chiefly in young women that the infectious processes destroying the tubes are acquired.

In 518 cases tabulated according to age, on which this argument has been prepared, 321, or 62 per cent, occurred between the ages of eighteen and twenty-nine; between the ages of thirty and thirty-eight, 139, or 27 per cent, of these infections occurred. Before eighteen and after thirty-eight the number of cases was relatively negligible, though they varied from fifteen years to fifty-two years of age.

The preservation of the uterus, too, depends, as has been intimated, upon ovarian conservation and upon a second factor, that is, a uterus

that is not too badly diseased. Uteri which contain multiple fibroid tumors or which are suppurative in themselves are to be sacrificed in the great proportion of the cases.

The series referred to consists of 518 cases of general pelvic peritonitis involving the tubes which were treated by abdominal section. In this series both tubes were removed 445 times; one tube was removed 52 times; and both tubes were left in the remaining 21 cases. Of these 445 cases wherein both tubes were removed, hysterectomy was performed 199 times, leaving 246 cases, or 55 per cent, wherein some disposition *in situ* had to be made of the uterus.

In a survey of this material we may discuss four possibilities.

First, the uterus may be left alone. In my experience this is rarely applicable. In the first place, the uterus is often already displaced, either as a result of the diseased condition for which the operation is performed or as the result of some other pre-existing factor. Of the 518 cases referred to, the uterus was retroverted 199 times, or 38 per cent. It was fixed in retroversion 150 times and it was free 45 times. In 10 of these cases the uterus was in first degree and in 3 cases in second degree procidentia. The uterus was upright in 319 instances, fixed in 266, and free in the remaining 53. The removal of the tubes, therefore, and the breaking up of the adhesions so often weakens the broad ligaments that the uterus, even where it is already upright, is left in a condition of mobility, as a result of which it would be reasonable to expect it to become retroverted. Besides this, the uterus is in nearly every case involved in some degree of metritis, as a result of which it is enlarged, soft and boggy. This change is most evident, as Bell has pointed out, in its upper portion, so that even where it is upright prior to operation this condition provides another factor for bringing about subsequent retrodisplacement. Further, the menstrual disturbance which so often characterizes pelvic peritonitis is most apt to persist where retroversion is permitted. Therefore, in the large number of cases in which the uterus is already retroverted I do not believe it is desirable to leave it in such a position. It is true that retroversion of the uterus *per se* does not always bring about pathologic changes in the organ itself, but such displacement is a certain factor in the production of pathologic conditions, such as pelvic varicosities, ovarian congestion, procidentia, and of symptoms such as pain in the pelvis, backache, bearing down, and hemorrhage. Furthermore, particularly in pelvic peritonitis, it is desirable to leave the pelvis free from all raw peritoneal areas after the removal of the tubes, and the peritoneal surface of the uterus is in nearly every instance so involved as to defeat the purposes of peritonization. It is true that in a few cases the uterus may be so free from adhesions, so movable, so small, and in such a normal position with such excellent tonicity of its liga-

ments that it may be left without any particular procedure being employed to maintain it where it should remain, but it is equally true that in the great majority of cases such circumstances do not obtain, and it is, therefore, necessary to undertake some procedure aimed at maintaining the uterus in its normal relation to the other pelvic structures.

The *second* method of treating the uterus consists in some method of

Fig. 1.*—The tube masses have been freed and are held up with the fundus of the uterus from which the round ligaments have been ligated. The fundus of the uterus is being amputated. *A.* The line of amputation—anterior and posterior wall. *B.* Line of amputation from a lateral aspect.

round ligament shortening. I have long been of the opinion that shortening of the round ligaments should be reserved for cases where pregnancy is to take place in the future, that is, in simple retroversion where the tubes are not diseased or where but one tube has been re-

*This and the following illustrations are from an article by the author, published in The Surgical Clinics of Chicago, W. B. Saunders Co., October, 1919, iii, No. 5, p. 1290.

moved. In the series of 518 cases just referred to, one tube was left 52 times; both tubes were left 21 times. Round and uterosacral ligament shortening was resorted to 52 times, either for the purpose of replacing the uterus where it had been retroverted or of covering raw areas on the uterine wall. Shortening of the ligaments as a means of overcoming retrodisplacements of the uterus, regardless of the method employed, is attended by a certain percentage of failures. In ligament shortening we are merely doing the best we can with the material at our disposal and this material is not always of the best quality. The ligaments are lax and attenuated or at times infiltrated and not readily freed. In addition, ligament shortening is poorly employed where the uterus is metritic, or where it is enlarged as the result of general fibrosis or of the presence of fibroid tumors. Fibrosis was present in 54 of the 199 uteri removed, and fibromyomata in 80.

The *third* method of disposing of the uterus is the one that is probably the most generally employed throughout the various surgical clinics of this country. I refer to ventral fixation, where the fundus of the uterus is fastened to the anterior abdominal wall by some method or other. This procedure leaves the uterus relatively immobile in a position that is abnormal. It forms a pillar in the lower mid-abdomen, renders peritonization difficult or impossible, and like the other two methods it requires that the entire uterus be left except for such portion of the cervix as may have been dealt with by plastic operation. Here again the metritic uterus responds poorly to such treatment, fibromata and fibrosis contraindicate the procedure and the menstrual disturbances are apt to persist. It is safe to say that secondary operation for removal of the uterus more often follows ventral fixation than any of these other procedures.

The method which the writer favors or wishes to emphasize at this time consists in the removal of the entire fundus of the uterus, a procedure which leaves a small organ that can be entirely covered by peritonization and which leaves the organ in its normal position, capable of maintaining menstruation in a degree sufficient to satisfy the physiological and psychologic requirements and at the same time not be subject to subsequent excessive bleeding. Such an operation was described in 1913 by Blair Bell and about the same time by Buettner. Buettner's operation is based on the principle inculcated by Faure, that operation upon the adnexae should be from the midline toward the pelvic wall. After first ligating to prevent hemorrhage but leaving the round ligaments attached, Buettner excises the fundus uteri by transverse wedge-shaped incisions, the wedge being split mesially and each piece freed from its broad ligament. The wound in the uterine cavity is then sutured. The fallopian tubes were removed from below upward and from within outward. The parietal

peritoneum from the anterior abdominal wall or from the urinary bladder was then sutured to the upper posterior wall of the uterus just back of the line of incision, thus bringing the uterus into permanent, mobile anteflexion. The advantages of this procedure, as claimed by Buettner, are that menstruation is assured, the possibility of a chronic
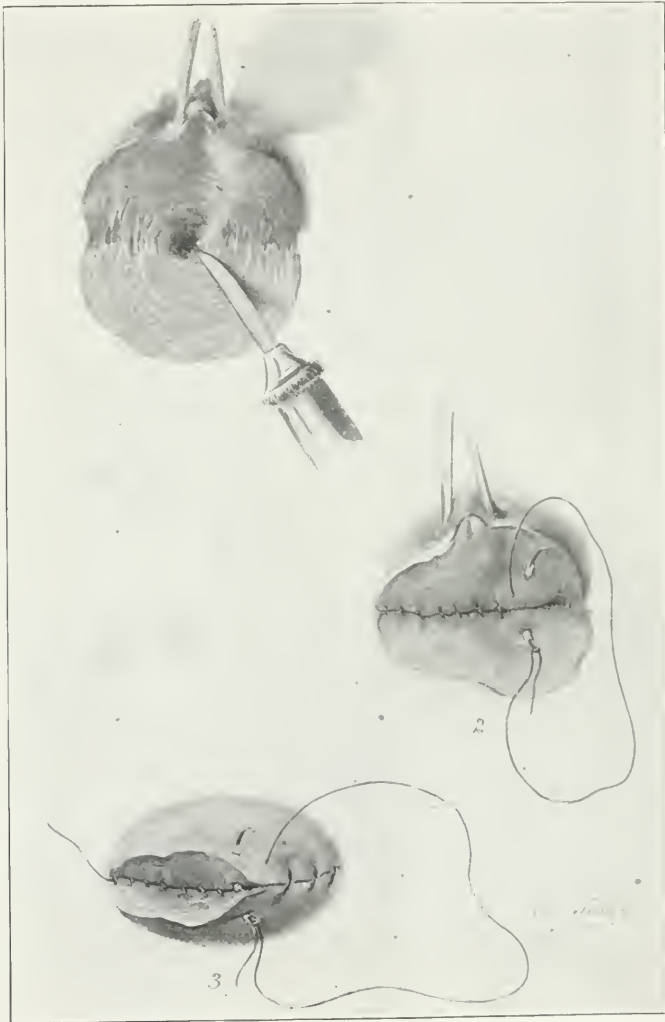
Fig. 2.—1. The exposed mucosa is lightly seared with the cautery directly after the fundus of the uterus has been amputated. 2. The first line of suture closes the uterine cavity by bringing the anterior and posterior uterine walls together, the catgut passing through musculature only. 3. A continuation of the preceding, carrying the suture back and bringing together the edges of the uterine walls.

metritis is obviated, and menstrual disorders disappear, the flow becoming normal in amount and duration.

Bell's procedure differs in some details. After removal of the tubes and possibly one ovary, Bell excises the fundus of the uterus by ante-

rior and posterior incisions from above downward and inward, the ascending branches of the uterine artery are caught, and the anterior and posterior flaps are sutured together by mattress sutures. The cut edges of the mesocervix on one side and the broad ligament on the other are sewn together and the lower ligatured stumps inverted between the layers of peritoneum. The uterine ends of the round ligaments are then sutured with fine silk to the top of the uterine stump and the ligament of the remaining ovary is attached to the round
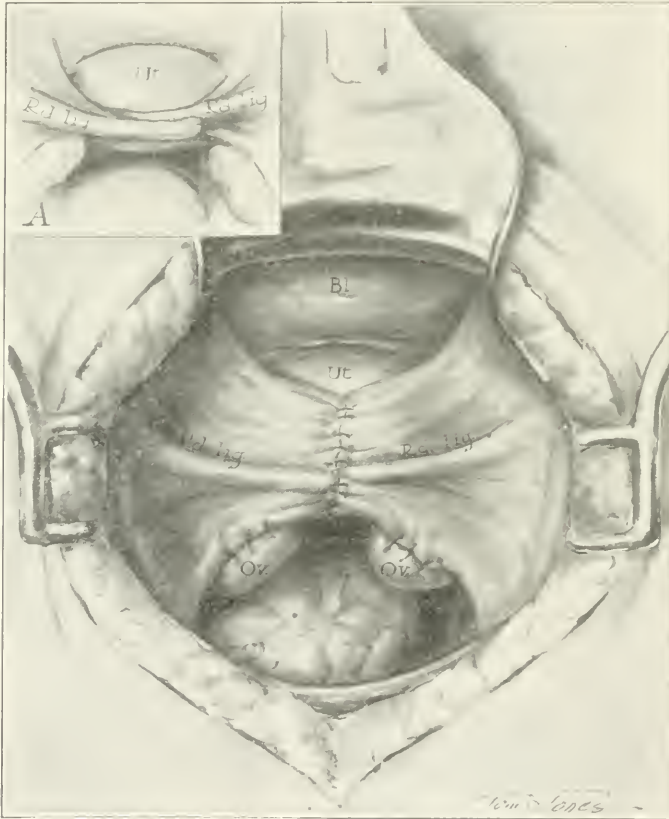
Fig. 3.—After suturing the uterine walls together the round ligaments are imbricated across this new fundus, the right one to the left side and the left one to the right side, as in A. The slackened broad ligaments are then brought together from side to side, anteriorly and posteriorly. Each ovary is suspended to its broad ligament. The pouch of Douglas is left open where there are no extensive areas of raw or infiltrated tissue.

ligament on its own side. The operation described by Polak in his recent monograph is a modification of the Bell-Buettner technic, emphasis being placed upon conservation of the ovarian blood supply.

Of the 445 cases in which both tubes were removed the uterus was treated as follows:

In 199 operated cases it was removed. Ventral fixation was performed 41 times, but it should be noted that this procedure was

employed only in the earlier cases of the group. In recent years its use has been exceptional. Round ligament shortening was not resorted to in any case, neither was the uterus left unsupported. In 219 cases the uterus was treated by a modification of the operation as described by Bell and Buettner, without following the principle of Fauré.

The tubes are removed by ligature and excision from their infundibulo-pelvic reflection towards the center. The round ligaments are then ligated close to the uterus and cut away and a second ligature is passed through the broad ligament on each side to catch the fundal branches of the uterine artery. These in turn are cut, leaving exposed
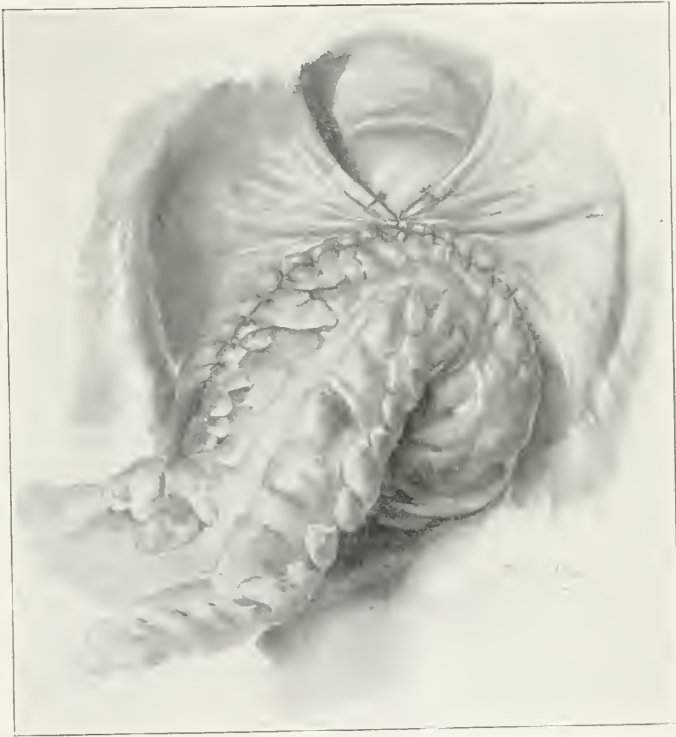
Fig. 4.—Where extensive raw or infiltrated areas are present in the pouch of Douglas, this space is entirely closed over with the sigmoid flexure and rectum.

the entire fundus of the uterus with the two diseased tubes attached. Excision is carried out by transverse incisions anteriorly and posteriorly, from above downward and inward. This removes in the majority of the cases fully one-half of the corpus uteri by bulk but preserves all of the corpus mucosa except that small portion lining the fundus. I estimate that not more than 25 per cent of the corpus mucosa is ever removed by this procedure, and it has never been necessary to ligate the uterine artery. The anterior and posterior flaps are then sutured together with running catgut in two stages, the first

closing the uterine cavity and the second bringing into approximation and closing the edges of the wound. With the stump of the uterus now held lightly by a volsellum forceps at its central point, the left round ligament is picked up and sutured into the right horn by an over and over linen thread and the right round ligament into the left uterine horn. This overlapping of the round ligaments is readily effected and quite covers the entire raw edge left in suturing together the two edges of the uterine wall. It also takes up whatever slack may be present in the round ligaments and puts the anterior and posterior layers of the broad ligament on the slack. This renders the next and final step in peritonizing the organ readily possible. With a thread of fine catgut on a round curved needle the broad ligaments on either side are picked up on the level of what would correspond to the anterior culdesac and sutured together from side to side, thus covering the anterior wall of the uterus as far as the round ligaments. The same suture unites the round ligaments at the midpoint of the new fundus and is then carried on down approximating the posterior layers of the broad ligament from either side, the final stitches fastening the broad ligaments securely to the posterior uterine wall as low down as may be desirable. The posterior culdesac is left open if there are no raw peritoneal surfaces, but if extensive raw areas do exist, the culdesac is blocked off by the so-called high sigmoid flexure peritonization. This procedure leaves a small uterus in normal position entirely covered anteriorly and across its fundus by clean peritoneal folds and at the same time it reinforces the transverse septum that is normally present in the pelvis. Peritonization is completed by suspending each ovary to the broad ligament on its respective side in such a way as to roll under the raw edge left by the removal of the tube as far as the infundibulopelvic ligament. In all respects this treatment of the uterus is similar to Bell's ''acro-hystero-salpingectomy'' except in the method of peritonization which requires freeing the round ligaments. In my opinion imbrication of the round and approximation of the broad ligaments from side to side over the uterus is superior to the method described by Buettner. I do not believe that the fundus is removed amply enough to satisfy the advantages set forth by Bell or Polak without first freeing the round ligaments.

If the uterus has been in retroversion and the cervix continues to swing too far forward, shortening of the uterosacral ligaments is carried out exactly as is done in association with round ligament shortening for simple uterine retroversion.

The advantages of such disposition of the uterus after bilateral salpingectomy are that the uterus continues to menstruate and its fundus which, as Bell has pointed out, is the most infected portion of the corpus uteri, is removed.

In only exceptional cases have the round ligaments been so infiltrated on one or both sides as to render imbrication impossible. In such cases I have fastened each ligament into the uterine angle on its own side and then covered the fundus of the uterus with vesical peritoneum as described by Buettner, or where the posterior culdesac has been raw, I have brought the appendices epiploicae of the sigmoid flexure up over it.

The treatment of the cervix depends, of course, upon its condition. In many of these cases the cervix shows the redness and swelling of a cervicitis. In that proportion of cases in which the cervix is appreciably involved in chronic inflammatory processes or where it has been lacerated by childbirth, it is amputated preferably by mid or high amputation, otherwise it is let alone.

While fixation of the uterus into the abdominal wall was used in the early years of my experience, this procedure has been virtually abandoned in favor of the operation of defundation as here described. In other words, today I either take out the uterus or amputate its fundus, the latter method being reserved for the young and particularly for the childless. Patients operated upon as long ago as 1913 are still menstruating. There has been little or no dysmenorrhea complained of and in not one instance has the follow-up revealed a premature menopause or a continuance of excessive uterine bleeding. On the contrary the menses are scanty in amount and their duration from one to three days. The problem of leucorrhea remains, but it always will remain as long as the cervix remains. After reposition of a displaced uterus the congested cervix readily clears up, as was pointed out by Sir J. Y. Simpson years ago. This is particularly true after removal of suppurating tubes. The discharge is much less in amount, is less constant and in numerous cases is no longer noticed by the patient.

While it is not the purpose of this paper to take up in detail the problem of the disposition of the ovary, it will be of interest to note that of the cases in this tabulation both ovaries were removed 85 times. In these cases, of course, the uterus was always removed. One ovary was left 281 times. Of the 85 bilateral oophorectomies, autotransplantation was performed but 9 times. In 5 cases no ovarian tissue was to be found on one side. Bilateral ovarian resection was carried out in 46 cases and unilateral resection in 146 cases. The microcystic ovary I no longer resect. In none of the cases seen subsequently has it been necessary to operate for removal of the ovary or of the defundated uterus, whereas five hysterectomies have later been performed out of the 41 cases treated by ventrofixation. Preservation of ovarian tissue prior to the menopause years is invaluable to the patient, and I am fully convinced that better results are obtained where the ovary

is left in its normal situation with its normal blood supply than where it is removed and transplanted elsewhere.

The conclusions offered as a result of this study are:

First. Ventral fixation of the uterus has objections which render it an undesirable procedure in association with removal of both tubes.

Second. That round ligament shortening is unsuitable where the tubes have been removed and should be reserved for the simpler uterine displacements where pregnancy is to follow.

Third. That the reduction of the uterus in size by removal of its entire fundus is a ready method of disposing of the organ after salpingectomy where, particularly in young women, it is desirable to preserve menstruation. Defundation becomes a logical procedure not only in operating for the cure of infectious processes, but also for simple sterilization, for ectopic pregnancy, ovarian cystomata and like conditions. Its only contraindication from a technical point of view is that of procidentia uteri.

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CONCERNING TORSION OF THE UTERINE ADNEXA OCCURRING BEFORE PUBERTY, TOGETHER WITH A CONSIDERATION OF TORSION OF NORMAL ADNEXA. REPORT OF A CASE AND A REVIEW OF THE LITERATURE SINCE 1900*

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CONCEDING for the moment that the torsion of normal uterine adnexa is an accepted fact, a classification of the different types of adnexal torsion may be made as follows:

    I. Pathological Adnexa.
        (1). Torsion of ovarian tumors.
            (A). Before puberty.
            (B). After puberty.
                (a). In the nonpregnant state.
                (b). During pregnancy and the puerperium.
        (2). Torsion of tubal tumors including hydro-
            salpinx, hematosalpinx and pyosalpinx.
    II. Normal Adnexa.
        (1). Within the abdomen.
            (A). In the nonpregnant state.
            (B). During pregnancy.
        (2). Within a hernial sac.
            (Not to be confused with simple strangulation.)

That ovarian tumors in the adult, especially cysts, are very prone to undergo torsion of the pedicle, is well known to gynecologists and to medical men in general. Such a complication giving rise, as it frequently does, to violent and serious symptoms, has provoked considerable interest and given rise to an extensive literature upon the subject. The accident is by no means an infrequent one. A. Martin[9] reports that 5 per cent of the ovarian tumors upon which he has operated were the subject of torsion, and B. Küstner[9] reports 47 per cent. Such figures, inexact as they are in showing how frequent the complication is, at least demonstrate that the subject is important and justify a critical study of every phase of it.

Viewing the whole topic of torsion of the uterine adnexa in a comprehensive way we may classify it conveniently as we have done at the beginning of this article. It will be noted that the most important items are already well known or have at least been well covered in

other papers. Anspach's[1] article discussing a less common phase is full of interesting facts and is the best we have found on the twisting of tubal enlargements. He has reviewed and summarized 88 reported cases and has distinctly advanced our knowledge of this condition.

There are some phases of the subject as a whole in which professional experience has been relatively small. Among them we may properly place torsion of the uterine adnexa in childhood, and that of normal appendages. In the literature of the past 20 years we have been able to collect but 25 instances of torsion of ovarian tumors before puberty. Our interest in the subject was aroused by the observation of the following case, which before the examination by the pathologist seemed to be one of torsion of a normal uterine appendage and which we believe yet might properly be discussed as such. The small cyst that was found had not materially changed the size of the ovary so that this has led us to a consideration of the twisting of normal adnexa.

M. M., age nine, entered Blodgett Memorial Hospital on May 28, 1920, with the diagnosis of acute appendicitis. Four days previous to admission the child had been seized with severe pain in the right lower quadrant. She vomited the evening of the day of the onset and this was repeated once or twice on each of the two following days, ceasing on the fourth day. She had been given no food since the beginning, except a little broth after the vomiting ceased. The pain continued in moderate severity and was intermittent. She had some pain when she evacuated the bladder. Had never had any previous similar attacks. The physical examination showed a well-nourished child, normally developed for her age. The child appeared moderately ill. Temperature on entrance 101.° Pulse 126. Respiration 26. The abdomen was very slightly, if any, distended, and there was a suggestion only of rigidity confined to the right lower quadrant. There was well defined tenderness in this area. Her abdominal cutaneous reflexes were all present. A slight dullness was noted in the right lower quadrant, but no mass could be made out. Rectal examination showed a tender, indefinite mass or fullness in the right side of the culdesac rather high up. Urinalysis showed albumin and a few leucocytes in the urine. Blood count showed 14,000 leucocytes and the differential count, polymorphonuclears 84, large lymphocytes 6, and small lymphocytes 10. Although the lack of rigidity was somewhat unusual, we could only conclude that she was suffering from an acute appendicitis. She was operated upon at once.

Operation.—The usual gridiron incision in the right lower quadrant. On opening the abdomen a small amount of bloody exudate escaped, coming apparently from the pelvis. A firm mass was found on the right side which proved to be the tube and ovary twisted in such a way as to completely block the circulation of both. It was black in color. The mass was about the size of the average normal adult ovary. It was brought to the surface, the pedicle untwisted and ligated, and the mass removed. The uterus was small and undeveloped. The opposite adnexa were palpated, and a small, apparently normal ovary identified; During the removal of the right appendage the appendix came into view. It was slightly edematous, but no more so than the surrounding parts. It was removed and the abdomen closed without drainage. The patient made an uneventful recovery, leaving the hospital 14 days later.

Pathological examination by Dr. Geo. L. Bond, shows that the tissue consisted of a dark mass densely infiltrated with blood which had undoubtedly increased its size

to a considerable extent. The mass measured 4 cm. x 6 cm. There was a small cyst present in the mass 3.7 cm. x 2.1 cm. The whole mass was about the size of the average adult ovary. Between the cyst and the tube there was a distinct membrane, probably the outer wall of the cyst. Microscopically the tube wall was infiltrated with round cells and leucocytes. The tube was edematous and the vessels filled with blood. The ovarian structure was lost, being replaced by partly organized clots. The cyst wall was formed of old, dense, edematous, fibrous tissue, and epithelial cells could be distinguished in its surroundings. The exact nature of the cyst could not be determined, but it resembled an ordinary follicular one of the ovary. The appendix showed periappendiceal changes, with great thickening of the peritoneal coat. There was no reason to believe that an acute appendicitis existed, the changes in the appendix undoubtedly being secondary.

We have collected, as above stated, twenty-five other cases of torsion of ovarian tumors before puberty, which we have abstracted and reviewed.

CASE 1.—Harrigan: Am. Jour. Obst., 1915, lxxi, 808. Age twelve. Seen four days after the onset. Complaints were abdominal pain and persistent vomiting. Rigidity present over the lower abdomen. Rectal mass palpable. As to diagnosis, appendicitis, tuberculous peritonitis and ovarian cyst were considered. At operation an orange sized cyst of the left ovary was found that had undergone two complete turns. The right ovary was congested. Tumor was a cystadenoma. Recovery.

CASE 2.—Bornstein: Jour. Am. Med. Assn., 1909, liii, 1102. Age fourteen. Never had menstruated. Prodromal symptoms for three months. Then an acute attack with pain in right iliac region. Repeated vomiting and distention. The preoperative diagnosis was acute appendicitis. Operation. A large cystic tumor of the right ovary twice the size of a man's head was found. Twisted once. Recovery.

CASE 3.—Loving: Jour. Am. Med. Assn., 1908, 1, 1350. Age six. Child previously well. Acute onset. Complaints were pain in the epigastrium and a pressing desire to urinate. Abdomen rigid and tender. Tumor in hypogastrium reaching to umbilicus. Operation. Large unilocular cyst of the right ovary twisted 1½ times. Measured 12.5 by 10.5 by 35 cm. Weight 640 grams. Recovery.

CASE 4.—Swainson: Proc. Roy. Soc. Med., London, 1909-10. iii. Sec. Stud. Dis. Child, p. 72. Age two. Complaints. Abdominal pain and vomiting for four days. Abdomen rigid and distended. Tumor in right iliac fossa. In the diagnosis, intussusception, tuberculous peritonitis and appendicitis were considered. Operation. Strangulated ovarian tumor the size of a tangerine orange. Type not stated. Recovery.

CASE 5.—Sutcliffe: Lancet, London, 1907, ii, 772. Age three. Violent abdominal pain and vomiting for one day. Tumor in middle of abdomen. Operation. Cocoanut-sized adenoma of the right ovary twisted four times was found. Recovery.

CASE 6.—Thellung: Cor.-Bl. f. Schweiz. Aerzte, Basel, 1908, xxxviii, 490-5. Age 8. Two attacks had occurred respectively 15 months and 3 months before the one leading to operation. Complaints. Pain in the right lower quadrant and vomiting of three days' duration. Tumor in iliocecal region and moderate rigidity. Preoperative diagnosis, perforated appendix with abscess and peritonitis. Operation. Small amount of blood tinged exudate. Fist-sized right ovarian cyst twisted once. Right tube and uterus also twisted, the latter at the level of the cervix. Recovery.

CASE 7.—Angus: Brit. Med. Jour., 1906, i, 199. Age six. Abdominal pain and vomiting for three days. Abdominal distention and dullness above pubes and in

right flank. Operation. Dermoid of right ovary the size of a duck's egg. Twisted 2½ times. Tip of appendix attached to the mass. Fell out of bed after operation and never regained consciousness. Death. Autopsy negative.

CASE 8.—Vineberg: Med. Record, 1915, lxxxvii, 586. Age nine. Complaints. Abdominal pain and vomiting. Rigidity and tumor mass to the umbilicus. Preoperative diagnosis. Twisted ovarian tumor. Operation. Large cystadenoma twisted two times. Recovery.

CASE 9.—Goldstine: Surg., Gynec. and Obst., 1920, xxx, 627. Age twelve. Had an attack two months previous to present one. Complaint, abdominal pain. Preoperative diagnosis. Ruptured appendix. Operation. Ovarian cyst twisted two times. Recovery.

CASE 10.—Hodgson: Univ. Durham. Coll. Med. Gaz., London, 1916, xvi, 104. Age eleven. Onset sudden. Complaint. Pain in right lower quadrant accompanied by vomiting. Mass felt in right iliac fossa, just above the pelvic brim. Rectal examination showed a mass in the pouch of Douglas. One previous attack about two weeks before present trouble. Preoperative diagnosis. Appendicitis with abscess formation. Operation. A dermoid cyst about the size of a cocoanut with a long pedicle was found which had become twisted. Recovery.

CASE 11.—Sourdat. Rev. Mens. de Gynéc. de Obstét. et de Pediat., Paris, 1912, vii, 131-133. Age 12. Complaint. Abdominal pain and vomiting of two days' duration. Abdominal tumor the size of a child's head. No ascites. Child's abdomen had been enlarging for more than a year and at times she had complained of vague abdominal pains. Preoperative diagnosis. Ovarian cyst with torsion. Operation. A dermoid cyst the size of an adult head and containing about two liters of straw-colored fluid, with a pedicle twisted one-half turn was found. Recovery.

CASE 12.—Eisenbuch: Gynäk. Rundschau, Berl., u. Wien., 1917, xi, 233:248. Age ten. Onset sudden without previous symptoms. Complaint. Abdominal pain followed by vomiting. Palpable tumor in the lower abdomen the size of an apple. Preoperative diagnosis. Twisted ovarian tumor. Operation. Small amount of ascitic fluid escaped. A hard, fist-sized dermoid tumor of the left ovary twisted 180° to the right was found. Recovery.

CASE 13.—Nagel: Zentralbl. f. Gynäk., 1912, No. 22, p. 714. Age five. The case was demonstrated before the Gynecological Society of Berlin as a twisted ovarian tumor. It was about the size of a child's head and there was beginning necrosis. The cyst was a dermoid.

CASE 14.—Roll: Abstracted by Eisenbuch. Age eight and one-half. Had attacks of severe abdominal pain at times for three years lasting up to 12 hours. Seemed to depend on bodily exertion. Usually disappeared after the bowels had moved. Finally pain persisted in spite of bowels having moved, and there developed the symptoms of a peritonitis. Rectal examination showed a movable tumor. Preoperative diagnosis. Twisted ovarian cyst. Operation. Peritonitis present. Left ovary kidney-sized. It consisted of a brownish black hematoma. Pedicle twisted three times from left to right. Right ovary small and cystic and larger than an adult ovary. Its infundibulopelvic ligament was 5 cm. long. Recovery.

CASE 15.—Roll: Abstracted by Eisenbuch. Age seven. A sister of the previous patient. For one year had similar complaint to that of her sister. Usual symptoms of torsion made a laparotomy necessary. Operation. The left ovary consisted of a necrotic hematoma. Right ovary was cystic and about twice the normal size. Recovery. In each of these two cases the right appendage was sutured to

the pelvic wall in order to prevent a repetition of the accident due to unusually long ligaments. In each case further examination showed the cysts to be dermoids.

CASE 16.—Selzer: Abstracted by Eisenbuch. Age eight. Complaint. Abdominal tumor. Preoperative diagnosis. Appendicitis or localized peritonitis. Operation. A left-sided ovarian dermoid was found with torsion of the pedicle. Recovery.

CASE 17.—Nagel: Ztschr. für Gynäk., 1904, liii, p. 580. Age eight. Complaint. For three days there was abdominal pain, vomiting and obstipation, accompanied by abdominal distention. For one year the child had abdominal pain at times and the parents noticed some increase in the size of the abdomen. Operation. A twisted ovarian dermoid the size of a child's head was found. Torsion of 180°. Recovery.

CASE 18.—Heaton: Brit. Med. Jour., 1901, ii, p. 1559. Age eight. Had several previous attacks of abdominal pain. Complaint. For five days lower abdominal pain, vomiting and tenderness in lower abdomen. Tender tumor mass in right iliac fossa. Operation. A unilocular cyst of the left ovary twisted 4½ times was found. Recovery.

CASE 19.—Askanazy: Abstracted by Eisenbuch. Age nine. Complaint. Abdominal pain. At operation a twisted dermoid cyst was found.

CASE 20.—Karazewski, A.: Medycyna, Warszawa, 1903, xxxi, 598:625. Age ten. Child constipated since birth. During the seventh year had quite severe pain in the left side of the abdomen, after a long period of obstipation. Some improvement after heat to abdomen and enemas. Child had repeated attacks of this trouble once or twice a week, pain lasting 5 to 10 minutes. In the three years previous to operation had three severe attacks. Finally while in school was struck in the abdomen by the elbow of another child. Next day complained of severe pain in the left lower quadrant. Enema gave a small amount of hard stool. Vomiting ensued and the pain became worse. Was given castor oil which resulted in a small liquid stool. Abdomen not distended. Considerable rigidity of the abdominal muscles. Distended coils of intestine were noted. Tenderness in the left lower quadrant. Preoperative diagnosis. Intestinal obstruction. Operation. Colon came into the wound as a sausage-sized mass, filled with fluid and the sigmoid was found to be twisted. The anus was dilated after the sigmoid was untwisted and yellowish foul-smelling fluid was evacuated per rectum. Above the symphysis lying against the abdominal wall there was a tumor of the left ovary which was twisted, the pedicle consisting of the tube and the broad ligament. Tumor was an ovarian dermoid. Removal. Recovery.

CASE 21.—Meigs: Boston Med. and Surg. Jour., 1900, Lancet I.* Abstracted by Eisenbuch. Age ten. No previous symptoms. The child fell from a box and later developed intense abdominal pain which increased in severity. Also showed signs of shock. The abdomen was tender and tympanitic. Preoperative diagnosis. Kinking of the ureter with hydronephrosis. Operation. Under anesthesia a tumor about the size of a child's head below and somewhat to the right of the navel was found. A dermoid of the right ovary twisted 1½ times was found and removed. Recovery.

CASE 22.—Owen, E., and Green, C.: Brit. Med. Jour., 1904, ii, 1517. Age ten. Complaint. Enlargement of the abdomen, abdominal pain and vomiting. Operation. Under the anesthetic the uterus was found to be displaced to the right and a tumor noted reaching almost to the umbilicus. A cocoanut-sized ovarian dermoid which was twisted 1½ times from the left to the right was found and removed. Patient's condition was good for five days and then she had a convulsion. On the

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*Unable to find original reference.

sixth day developed symptoms of a bowel obstruction and was re-operated. A piece of ileum was found adherent in the pelvis. It was released. Recovery.

CASE 23.—Freund: Zentralbl. f. Gynäk., 1919, iv, 76. Age thirteen. Onset sudden. Complaint. Severe pain in the lower abdomen, lasting three days. Developed peritoneal symptoms. Abdomen distended. Rectal examination showed a small anteflexed uterus and a left-sided tumor about the size of a child's head. Operation. Considerable blood in the peritoneal cavity and a large coagulum was found in the culdesac. The uterus was partially bicornuate. The right ovary was quite large. Right tube normal. On the left side there was an ovarian tumor with its pedicle twisted 2½ times toward the right. It was full of blood and about twice the size of an adult fist. The left tube was twisted with the ovary and there was some blood in the tube. Removal. Recovery.

CASE 24.—Christel, K.: Zentralbl. f. Gynäk., 1919, xliii, 302. Age five. Complaint. Severe pain in the abdomen and vomiting. Tumor palpated in the lower part of the abdomen in midline. Preoperative diagnosis. Twisted ovarian cyst. Operation. A right-sided ovarian dermoid with torsion of the pedicle was found. It was about twice the size of an adult first and infiltrated with blood. Recovery.

From a review of these cases, including our own, we obtain the following data. In age they range from two to fourteen. About 50 per cent occurred between the ages of eight and ten inclusive. The ovary alone was twisted in the majority of instances. In Case 6 the tube, ovary and the uterus to the level of the cervix were involved in the torsion. A volvulus of the sigmoid with intestinal obstruction was produced in one (Case 20). The type of tumor, dermoid, 15; simple cyst, 5; cystadenoma, 2; adenoma, 1. In two the nature of the tumor was not designated. It occurred nine times on the right side, with three others probably right; on the left nine times; four not given. Accordingly we have a proportion of about four to three in favor of the right side which corresponds roughly to Sanes'[9] figures on twisted tumors in adults (3 right to 2 left) and Anspach's[1] figures as to twisted tubal enlargements. In the majority of instances where it has been noted the torsion is in accordance with Küstner's law. This states that right-sided tumors twist from right to left, and left-sided tumors from left to right. The tumors varied in size from two reaching above the umbilicus to one the size of a walnut, one the size of a duck's egg, and our own about the size of an adult ovary. Opposite adnexa were normal in four cases; not mentioned in seventeen; stated to be congested in one; and in Case 23 the opposite ovary was described as "large." It is interesting to note that in each of Roll's cases occurring in sisters, the opposite ovary was cystic and there was an unusually long ovarian ligament. In both of these cases he sutured the remaining ovary to the lateral pelvic wall to prevent a similar accident upon the opposite side. The appendix was involved secondarily in two instances. In one the tip was attached to the pelvic mass and in the other it was somewhat edematous.

As regards symptomatology, there is little variation from similar

accidents occurring in adults—an acute abdominal crisis with pain, nausea and vomiting, prostration of varying degrees, tenderness, rigidity and distention, presence of tumor, increased pulse rate, temperature and moderate leucocytosis in cases where a blood count was made. These occurred variously combined and in different degrees as will be seen by looking over the case reports. It is to be noted the leucocytosis in such a crisis cannot be used to distinguish the case from one of inflammatory origin.

The occurrence of bladder symptoms in three cases of this series is rather interesting. Although there are innumerable instances of twisted ovarian tumor in the adult reported in the literature, Sanes[9] was able to find only nine cases that presented any bladder symptoms. He states that in five urination was painful and that in four it was difficult and frequent. The occurrence of these symptoms seems to be more frequent in children. In Case 1, the mother stated that the "urine had been cloudy for the past two days and that urination seemed painful." In Case 3 the attack was accompanied by a pressing desire to urinate and the patient was up all night trying to empty her bladder. In our case the patient had some pain on evacuating the bladder. It is common observation that many abdominal crises in children are attended rather frequently by disturbances of urination.

The diagnosis is difficult, chiefly because of the rarity of these cases and the similarity of their symptoms to those of other acute abdominal crises. The presence of a well-defined tumor is probably the most distinguishing mark that we have. A correct preoperative diagnosis was made in one-third of the cases. About one-third were diagnosed as acute appendicitis. In one case appendicitis, tuberculous peritonitis and cyst of the ovary were considered; in another kinking of the ureter with hydronephrosis; a diagnosis of intestinal obstruction was made in Case 20, and this was really present due to a volvulus of the sigmoid which complicated the torsion of the cyst.

We know of no way to estimate how frequently children with ovarian tumors suffer this complication. Such tumors in children are, of course, uncommon although Haubert* in 1911 collected two hundred of them from the literature. In his list there were 59 dermoids, a large proportion. In the 25 cases above reported 15 were dermoids.

The cause of torsion in children seems to be much the same as in adults and this has been thoroughly discussed elsewhere in the literature. However, it has been noted that this accident occurs frequently in association with the menstrual period, or during pregnancy and the puerperium and these factors are, of course, excluded in children.

The greater frequency of torsion on the right (3 to 2) Anspach[1]

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*Quoted by Harrigan. For reference see Case 1.

thinks is due to the greater roominess of the pelvis on the right side by virtue of the sigmoid being on the left and to the fact that the peristaltic action of the cecum and small gut is greater than that of the sigmoid and thus adhesions about the right adnexa are broken up more readily. He believes that the strangulation of normal tubes is almost inconceivable, but is barely possible if there is an abnormally long mesosalpinx, one or two accessory ostia, or greater length and thickness of the tube than usual. He makes no statement relative to the possibility of torsion of a normal ovary. This is at least more readily conceivable and surely not so difficult of proof.

In view of the fact that the ovary in our case was found at operation to be about the size of an adult ovary, and undoubtedly had been materially increased in size by extravasation of blood due to its twisting, we have considered the matter of torsion of normal appendages (both tubes and ovaries) and have reviewed the literature of the same. The ovary had been made larger than the ordinary one of childhood by what we believe was a small follicular cyst (3.7 x 2.1 cm.), but this was hardly large enough to classify it as a distinct tumor. In considering the matter of torsion of so small an appendage one must, it seems to us, reckon with the length of the mesentery and the relative size of the ovary or length of the tube. The tube or ovary may be histologically what we deem well within the normal, and yet be mechanically predisposed to torsion. Norris has suggested that an unusually large, heavy ovary may pull away from its attachments far enough to produce a condition similar to a pedicle. Auvray in 1912 in a series of three articles in which he reported two cases and reviewed all of those reported up to that time, has presented the most complete exposition of this subject that we have been able to find. His report includes six cases of torsion of the normal adnexa in the nonpregnant state and three cases during pregnancy. One of these is possibly open to question (Case 2). Since that time five cases have been reported which are included in the summary below: namely, those of Barrington, Munroe (two), Johannson and Schweitzer. At the time of Auvray's article only one case had been reported in the American literature. This naturally gives rise to speculation as to whether we have not overlooked this condition. Since that time in our literature there has appeared the article of Munroe, in which he reports two cases of torsion of normal ovaries in girls of ten and eleven years. Munroe states that the size of the ovaries was that of a lemon or small orange. Since no histologic examination was made, it leaves some doubt in one's mind as to whether they should be included in this group. Since, however, he reported them under this title we have done so.

Herewith is presented a short résumé of the claimed cases of torsion of normal adnexa.

IN THE NONPREGNANT STATE

GROUP I. TUBE.

CASE 1.—Stark: Jour. Obst. and Gynec., Brit. Emp., 1911, xix, 258. Age forty-six. Unmarried. Menstruation still regular. Three attacks of lower abdominal pain, all occurring a day or two after cessation of menstrual flow. Examination showed an unruptured hymen and on the right side of the uterus a firm mass about the size of an ordinary tomato. No preoperative diagnosis made. Operation. Few free blood clots found. Left fallopian tube twisted from right to left three distinct and complete turns. Fimbriated ends filled with blood clots. Tube removed together with ovary which was normal. The mass removed from the right side was a separate tumor imbedded between the layers of the broad ligament. It proved to be a dermoid. Microscopic examination of the removed tube showed no evidence of pregnancy. Recovery.

CASE 2.—Auvray: Arch. Mens. d'Obst. et de Gynée., 1913, ii, 97-104. Age twenty-eight. Virgin. Menstruation began at 13. Entered hospital with diagnosis of acute appendicitis. For two years had at intervals some cramp-like pains in the abdomen, mostly on the right side with a tendency to syncope. Present complaint. Right-sided abdominal pain and vomiting. The menses appeared on the third day of the attack. Vaginal examination was impossible. Operation. At the end of three weeks. Tip of the appendix was attached to the mass in the pelvis. The latter was the size of a mandarin orange. The ovary was normal and not involved in the torsion. The mass consisted of the tube twisted three times and distended with black bloody fluid. Pathologic examination showed some inflammatory changes including round cells and giant cells. These changes were considered secondary, but on the whole leave some doubt in one's mind as to the genuineness of this case. Recovery.

CASE 3.—McIlroy: Jour. Obst. and Gynec. Brit. Emp., 1910, xviii, 368. Age forty-six. Widow, 4-para. Complaint. Severe pain in left iliac region accompanied by sweating and collapse. Some prolapse of the uterus for past few years and menstruation had been irregular, the last period having occurred four months previously after an amenorrhea for one year. Mass noted in culdesac about the size of a large orange. Immovable and tender. Slight tenderness and rigidity in the left iliac region. Preoperative diagnosis. Incarcerated fibroid of the uterus and a tubo-ovarian tumor were considered. Operation. Left hematosalpinx with two complete twists was found. No free blood in the peritoneal cavity. The ovary was fibrous and was not involved. The opposite ovary appeared congested but otherwise normal. Recovery. Detailed pathologic examination failed to reveal any trace of chorionic villi or placental tissue.

CASE 4.—Schweitzer: Zentralbl. f. Gynäk., 1918, xlii, p. 25:33. Age twenty-one. Single. Never pregnant. Complaint. Severe pain in left lower quadrant, which subsided but did not entirely disappear. Five days later there occurred a more severe attack coming at the time of the menstrual period. Examination. On the left side near and behind the uterus was a tense tumor about the size of an apple which was not freely movable. Preoperative diagnosis. Left ovarian cyst with torsion. Operation. There were many adhesions about the tumor which was removed, leaving a healthy ovary. The tumor consisted of the left tube twisted two times to the left. The opposite tube and ovary were normal. The mesosalpinx, however, was about twice its normal length and the outer end of the tube reached downward far beyond the ovary. Recovery. Pathological examination. The tube showed only those changes which could be plainly accounted for by its torsion. The tube contained a dark reddish-brown fluid which was sterile. It had a rather long mesentery.

GROUP II. OVARY.

CASE 5.—Norris: Am. Jour. Obst., 1911, lxiii, 850. Age nineteen. Unmarried. Menstrual history negative. Onset three days before a period. While sweeping was seized with a sudden sharp pain in the right lower quadrant. Vomiting ensued. Was seen in half an hour and was in a state of partial collapse. Both recti were rigid, the right being more so. Hymen intact. Rectal examination. To the right and posterior to the uterus was a tense, fairly hard kidney shaped tumor about the size of a lemon. Preoperative diagnosis. Twisted ovarian tumor. Operation. The right ovary was about twice the normal size and twisted on itself 180°. The tube was congested and rotated about 40° in the same direction. No free blood. Salpingo-oophorectomy done. Recovery. Pathologic examination. This showed the tube to be normal. The lumen was patent and contained a little blood. The right ovary was 6 cm. by 2.3 cm. by 4 cm. No adhesions. There was a small cyst 4 mm. in diameter at the inner pole. This was a graafian follicle cyst. The ovary was densely infiltrated with blood. The appendix was normal.

CASE 6.—Barrington: Jour. Obst. and Gynec., Brit. Emp., 1916, xxvii, 141. Age thirty-eight. Married. 12-para. Developed a sudden pain in the abdomen while walking upstairs. This became quite severe and located in the right lower quadrant. Vomiting and diarrhea began in 15 minutes. Continued for 24 hours. On deep pressure tenderness was noted in the right lower quadrant. A mass was noted on rectal examination. Operation. An excess of clear fluid was found in the peritoneal cavity which was not blood-stained. Appendix normal. A tense, elongated mass was found behind the uterus on the right side at the bottom of the culdesac. This consisted of the right ovary and distal part of the right tube twisted on its pedicle one complete turn. No adhesions. The ovary and a portion of the tube were removed. The ovary was 6.5 by 3.5 by 3 cm. after hardening.

CASE 7.—Johannson: Nord. Med. Ark., Stockholm, 1917. L. afd., i, No. 4, pages 1-14. Age six. Eleven days before entrance had a short attack of pain in the right side of the abdomen. One week later a more severe attack with vomiting. Slight tenderness over the region of the appendix on deep palpation. No rigidity. Preoperative diagnosis. Acute appendicitis. Operation. Considerable blood escaped through the incision. Appendix normal. Right ovary enlarged four or five times and blue black in color. Its pedicle was twisted once. and part of the tube was also twisted. Opposite adnexa were normal. Right salpingo-oophorectomy was done and also an appendectomy. Recovery. Pathologic examination. This showed the tube to be swollen and edematous, but otherwise negative. The mesovarium was unusually long. Microscopically the ovary consisted of a complete hemorrhagic infarct and no details were possible. No cyst was present in the ovary. Considered a normal ovary previous to the torsion.

GROUP III. TUBE AND OVARY.

CASE 8.—Auvray: Bull. Soc. d'Obst. et de Gynéc., 1912, i, 727-731. Age fourteen and one-half years. Virgin. Menstruation began at 13. No previous symptoms. Entered with the diagnosis of acute appendicitis. Complaints. Right-sided abdominal pain and vomiting. Menstruation began on the third day of the attack. Operation. After an interval of three weeks. The right tube was found twisted two times on itself. No trace of any adhesions. Tube and ovary removed. Recovery. Pathologic examination. The fimbria were agglutinated together and both the tube and ovary were infiltrated with blood. There was no trace of chorionic villi or placental tissue. The diagnosis was torsion of a normal tube and ovary.

CASE 9.—Cassidy and Norbury: Lancet, London, 1911, i, 98. Age eleven. Complaint. Acute abdominal pain confined to the lower abdomen and worse on the left side than on the right. Vomiting. Pain on micturition and defecation. Similar

attack about three months previously. Tenderness present all over the lower abdomen, but chiefly in the left iliac region. Rigidity of the lower recti. Rectal examination showed a mass in the culdesac a little to the left of the midline. Preoperative diagnosis. Appendiceal abcess. Operation. A little blood stained fluid in the pelvic cavity. The uterus, the right fallopian tube and the right ovary were normal. The left ovary was found to be twisted with the corresponding broad ligament and fallopian tube was also twisted several times. Tube and ovary removed. Recovery. Microscopic examination of the ovary showed only extreme vascular engorgement.

CASE 10.—Munroe: Jour. Med. Assn. Georgia, August, 1917, p. 169. Age eleven. Onset sudden with pain in the right lower quadrant, nausea and vomiting. Some rigidity. On the fourth day a mass was felt below McBurney's point. Temperature 101.5, pulse 120, preoperative diagnosis. Appendiceal abscess. Operation. Fifth day. Appendix distended and inflamed, probably secondarily. In the pelvis a black looking mass about the size of an orange was found which consisted of the tube and ovary twisted several times at the junction of the tube with the uterus. Tube and ovary removed. No gross abnormality. Opposite adnexa were normal. Recovery. No microscopic examination was made.

CASE 11.—Munroe: Ibid. Age ten. Gave history of previous mild attacks suggesting appendicitis. Complaint. Colicky pain in the right lower quadrant persisting for about nine days. Temperature 102°. Pulse 120. Lower abdomen somewhat rigid. Mass felt in the right iliac fossa. Preoperative diagnosis. Appendiceal abscess. Operation. Appendix was slightly inflamed and was removed. Below this a dark-colored mass about the size of a lemon was found. This represented the tube and ovary attached by a twisted pedicle to a very small uterus. Tube and ovary removed. Opposite adnexa were normal. No gross disease of tube or ovary. Recovery. No microscopic examination was made.

GROUP IV. DURING PREGNANCY.

CASE 12.—Aulhorn: Zentralbl. f. Gynäk., 1910, No. 16, p. 538. Age nineteen. Never previously pregnant. Three months pregnant at time of attack. Several weeks before had slight pain in right lower abdomen which became better after a time. Complaint. Severe pain in the right lower abdomen of two days' duration. Abdominal rigidity present. Vaginal examination showed a fist-sized tumor which seemed to be on the right side. Preoperative diagnosis. Pregnancy with pyosalpinx was considered to be the most probable one. Operation. In the right side of the pelvis was found a distended tube and a large ovary twisted 180°. Pathologic examination showed the tube to be distended with clotted blood. The wall of the tube was thickened by hemorrhagic infiltration. The ovary was densely infiltrated with blood, but otherwise negative. Recovery.

CASE 13.—Lecene: Ann. de Gynée., July, 1912. Abstracted by Auvray. Age twenty-one, 2-para. Five months pregnant. Complaint. Had intermittent pain in lower abdomen since the beginning of the pregnancy. Suddenly developed pain in the right lower quadrant, diarrhea and vomiting. There was tenderness in the right lower quadrant and rigidity. Indefinite mass in this region. Preoperative diagnosis. Appendicitis. Operation. The right tube was found twisted on itself two times. Ovary not involved. Appendix negative except for old adhesions. The lumen of the tube was normal except for dilatation. The wall showed only hemorrhagic infiltration. Recovery.

CASE 14.—Hartmann: Ann. de Gynée., 1898, 1, 167. Abstracted by Auvray. Age twenty. Complaint. Vomiting, pain in the right lower quadrant, distention and obstipation. Preoperative diagnosis. Acute appendicitis. Operation. Twenty-four hours after onset. The uterus reached to the umbilicus. On opening the

abdomen some fluid escaped. The right adnexa formed a hemorrhagic looking mass and were twisted one full turn. The tube was patent and normal except for infiltration of blood. The ovary was the size of an orange. It was infiltrated with blood which had not originated from a ruptured graafian follicle. Recovery.

A review of these cases yields the following data:

Eight of the fourteen cases, more than half, occurred before the age of twenty; four of them under twelve, and presumably before menstruation had been established. The two oldest patients were forty-six years of age. In five cases the tube alone was involved in the torsion; in eight the tube and ovary, although in three of these the most distal portion of the tube only, the ovary being the essential factor in the torsion; in Case 9 the tube, ovary and broad ligament. The torsion occurred on the right side ten times and on the left four. The opposite adnexa were normal in seven; described as congested in one; and was not mentioned in five. In one case there was a dermoid cyst in the opposite broad ligament and in another the mesosalpinx on both sides is stated to be unusually long. The symptoms were the usual ones of torsion already commented on in this article. One-half of the patients had had previous attacks attributed to incomplete torsion. More than one-half the cases were diagnosed as acute appendicitis. Of the three cases operated during pregnancy all went to term.

Excluding those instances which occurred before puberty and during pregnancy, five out of the seven remaining occurred in close relation to the menstrual period. This is striking and would seem to give support to the theory of Payr[8] who experimentally showed that venous congestion in a pedicle is conducive to torsion. This has been described at some length by Anspach.[1] Payr injected the veins of the pedicle of a spleen that had been removed from the body and was able to produce a torsion of 125°, which he attributed to the fact that the veins of a pedicle are longer and more flexible than the arteries and under the influence of passive congestion assume a spiral course and so tend to impart a twisting motion to the tumor.

The subject may be divided into three groups, (1) torsion of the tube alone; (2) torsion of the ovary (which usually includes a small portion of the distal part of the tube); and (3) torsion of both. The views of Auvray[2] on the subject of torsion of the normal tube are interesting. He inquires as to whether the rarity of the condition is apparent or real. Many instances of twisted hematosalpinx have doubtless not been subjected to a thorough and adequate microscopic examination. In both of his cases he has the word of the pathologist that there were no chorionic villi or placental remains found. The congestion and hemorrhage into the tube were considered as being due to the torsion. The examination must of necessity be very thorough in order to positively exclude an ectopic as it may be rather easily overlooked. In

Case 8, (Auvray) the patient was a virgin of fourteen years and the tube was open so that any possibility of previous hydrosalpinx could be ruled out. Eight of the eleven cases occurring in the nonpregnant were in virgins which eliminates ectopic pregnancy from consideration. On the other hand Anspach[1] is of the opinion that in such cases the tube is probably the seat of a hydrosalpinx before torsion and that it is converted into a hematosalpinx as the result of twisting. He believes that a hydrosalpinx in virgins and in cases in which there is no history of previous pelvic infection may be the sequela of a gonorrheal vulvovaginitis in childhood which persists in latent form until puberty and then produces involvement of the tube which is not recognized. Again he says it may be residual following an unrecognized salpingitis in the course of a febrile, especially the exanthematous diseases, or it may be due to an attenuated tuberculous infection. The question then as to torsion of a normal tube seems to remain an open one, and Auvray makes a plea for careful histologic examination in cases of twisted hematosalpinx.

The cases reported of torsion of the normal ovary are more susceptible of proof and it is very difficult to dispute the histologic evidence presented in these cases. As to why a normal tube or ovary or both should become twisted, Auvray is somewhat in doubt, but thinks that possibly all the causes which bring about torsion of tubal enlargements and ovarian tumors must be included. Abnormal length of the tube or of the mesosalpinx or mesovarium would certainly also be a factor. It is conceivable that a slightly enlarged and prolapsed ovary which we may regard in the strict sense as nonpathologic, could become twisted. Auvray believes that a spiral course of the tube, which is normally present in fetal life and may persist as a congenital anomaly in the adult to a marked degree may be a predisposing factor. Under the influence of the passive congestion of pregnancy or the menstrual period (and eight out of the ten cases after puberty so happened) he thinks that the tube may increase in volume, may twist still more and go on to complete torsion according to the theory of Payr. All this, of course, is merely speculation, and is impossible to prove. Perhaps further study of these rare cases will throw more light on the subject.

The torsion of normal adnexa in hernial sacs represents the final subdivision of adnexal torsion. Auvray[2] has summarized fifteen of the twenty cases reported by Damianos in 1905 and adds two other cases. Heineck[5] in 1912 collected five cases of torsion of the ovary and eighteen cases of torsion of the tube and ovary in hernial sacs from the literature of the preceding twenty years. This accident represents a true torsion, and must not be confused with a simple strangulation of the adnexa in a hernial sac. Heineck states that so far as he has been able to determine, torsion of the pedicle has been observed only in

congenital hernia of the inguinal type. Auvray states that it may occur at the time of the first appearance of the hernia, or in those already established. It is decidedly an accident of infancy. The oldest reported case was five years and the youngest one month. Almost all of them, with four or five exceptions, occurred during the first year. It is of about equal frequency on each side. Pathologically the same changes occur as in torsion within the abdomen.

The clinical picture presented is usually that of an atypical strangulated omental or intestinal hernia. Obstipation is usually absent, and the general condition in most cases is not so serious. Neither is the condition so inclined to be progressive or persistent. Lecene's case was not seen until the fifteenth day and Damianos' not until the sixteenth. One case was operated three months after the torsion occurred. Rectal examination may be of considerable assistance in the diagnosis in that in infants the internal ring can often be palpated by this method. In only one case were the adnexa in such condition that it was impossible to return them to the abdominal cavity. There was no operative mortality.

SUMMARY

1. Torsion of ovarian tumors is an uncommon occurrence in childhood, as shown by the fact that only 26 cases, including our own, have been reported in the literature since 1900.

2. About 50 per cent occurred between the ages of eight and ten.

3. Sixty per cent of them were dermoids.

4. The tumors varied in size from that of an adult ovary to one reaching above the umbilicus.

5. The symptoms are those of an abdominal crisis similar to that of the same accident in adult life, sudden abdominal pain, vomiting, a variable degree of prostration, tenderness, rigidity, distention, temperature, increased pulse rate, and the presence of an abdominal tumor.

6. The diagnosis is usually difficult, probably due to rarity. Appendicitis is often the preoperative diagnosis.

7. The causes are much the same as in adult life.

8. Fourteen claimed cases of torsion of normal adnexa have been reported to date.

9. Eight of fourteen cases, more than half, occurred before the age of 20; four under 12, and presumably before puberty.

10. The tube alone may be involved, the tube and ovary together, or the ovary may be essentially the offending organ.

11. A large percentage occur in close relation to the menstrual period.

12. Three are reported during pregnancy.

13. Some question still exists as to whether a normal tube can undergo torsion, but it seems to be proved that a normal ovary may do so.

14. Factors such as the length of the mesentery, the size of the ovary, and the length of the tube, must be considered as well as the histologic structure of the organ.

15. Torsion of adnexa in hernial sacs (apart from strangulation) is relatively rare. It occurs only in congenital inguinal hernias and usually in the first year of life.

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MANAGEMENT OF ABORTION FROM A STUDY OF 530 CONSECUTIVE CASES*

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MY ONLY justification in presenting this paper for your consideration is that the conservative treatment of abortion, as we understand it, is not now in general use. Patients aborting at home are rarely treated conservatively, and but few hospitals follow absolutely the conservative treatment. The opinions expressed in the following paper are drawn from a careful study of five hundred and thirty cases admitted to the gynecologic service of Bellevue Hospital during a period of thirteen months ending March 1, 1921. Having treated so large a number of cases over so short a period of time, we feel that our observations may be of value. Abortion in this paper will refer to all interrupted gestations prior to the period of viability. We have considered abortion under two main headings: 1. Aseptic, 2. Septic abortions, and three minor headings: 1. Threatened, 2. Inevitable, 3. Incomplete abortions.

The abortion is considered septic if the temperature goes above 101° F. by rectum. It is also considered a septic case if there is a history of induction of the abortion or any subsequent intrauterine interference. The abortion is considered threatened if there is but moderate uterine hemorrhage, and no effacement of the cervical canal; inevitable if there is profuse bleeding especially if associated with

rhythmical uterine contraction, or if there is effacement of the internal os or partial protrusion of the ovum.

Our treatment has been primarily conservative and the form of treatment depends upon the type of abortion we are dealing with, namely; threatened, inevitable or incomplete, and aseptic or septic. Threatened abortions, which constitute a practically negligible number of hospital cases, but a very considerable number of home cases, are treated by absolute rest, the rest being maintained by morphine sulphate in one quarter grain doses given hypodermatically. This type of case, as a rule, within twelve or eighteen hours becomes either an inevitable abortion or the pregnancy continues as a normal one. The inevitable or incomplete case is the type constituting by far the largest number of our series. They have been treated in the following manner.

Patients, upon admission, are shaved and the vulva prepared as for labor. No examination is made prior to this aseptic preparation. They are then examined vaginally in the lithotomy position, using a bivalve speculum, and if any of the products of gestation are found in the vagina, or protruding from the cervix, they are removed by sponge stick. No packing is introduced unless there is considerable bleeding. Should there be considerable bleeding, which will occur in something over 70 per cent of the cases, the patient is packed. All cases classified as inevitable or incomplete abortion, whether they require packing or not, are given pituitrin in one-half c.c. doses every two hours for four doses. The packing is done with the patient in the lithotomy position without anesthesia and under strict aseptic precautions. The vagina is tightly and thoroughly packed through a bivalve speculum, using two inch strips of plain gauze. I wish to emphasize the necessity of tight and thorough packing. Many of our abortion cases are admitted with gauze or cotton floating about in the vagina, but I cannot recall a single case admitted during the past year that had been properly packed. The lack of proper packing is, I believe, one of the prime reasons for the omission of the conservative treatment of abortion. The packing is removed from the vagina in from twelve to twenty-four hours and in about 80 per cent of the cases requiring packing, sufficient of the products of gestation will be removed from the vagina with this packing to avoid the necessity of subsequent packing. Should marked bleeding recur, which will happen in less than 20 per cent of the cases, a second packing is applied in a manner exactly similar to the first. A very small percentage of our cases required packing more than twice and none were packed more than three times. Should the case continue to bleed following the second or third vaginal packing, and this will occur in something less than four cases in one hundred, curettage may then be indicated. We have already found that as our care in the management of these cases improves, the number requiring inter-

ference (and by interference I mean any intrauterine manipulation) grows less and less. We have found that in cases with moderate bleeding continuing over some time there is frequently a retrodisplacement which we have overcome, at least temporarily, by the use of a retroversion pessary and when this has been done, the bleeding soon ceases. All of our abortion cases are instructed to lie upon the abdomen at least eight hours in twenty-four, for we feel that this position favors both drainage and involution. Our patients are allowed out of bed the day after the bleeding ceases and unless there is some special contraindication, they are discharged from the hospital two days later if not bleeding. I have thus attempted to describe briefly the management of aseptic cases whether threatened, inevitable or incomplete. What of the septic cases?

We regard, after this method of classification, about one-sixth of the cases as septic. We are convinced that conservative treatment is proper in the aseptic cases, and being convinced of this fact, intrauterine manipulation of any kind is not permissible in the septic cases. In none of the septic cases was there any intrauterine manipulation or irrigation. We consider septic cases to be those in which the battle is entirely between the leucocyte and the organism, and any intrauterine interference, no matter how slight, will favor the organism by disturbing that protective area of round cell infiltration thrown out about the focus of infection. Our septic cases were placed out of doors and in the Fowler position. Their feeding was forced as much as possible. Some cases received repeated blood transfusions of small quantities of blood at a time, some received salvarsan intravenously, others were treated by vaccines and sera. This type of treatment is a matter upon which the attendant's personal opinion may rightly vary, but we can see no reason for variation of opinion from the conservative and the radical viewpoints. We have thus far noted no special difference in ultimate result or in the duration of illness in the septic cases relative to any special type of extrauterine treatment.

A statistical study of this series follows:

Patients treated 530
Cured or improved 517
Died 13
Mortality
Died of complicating diseases 6
    Bronchopneumonia 2
    Lobar pneumonia 3
    Pulmonary infarction 1
Died of postabortal sepsis 7
    Curetted prior to admission 4
    Admitted induction of abortion 1
Aseptic cases 440
Septic cases (Patients were considered septic if their temperature became higher
     than 101° F.) 90
    Recovered 83
    Died 7

Average period of gestation of 530 cases ....2 months
Average number of days of bleeding before entering hospital 11
Patients admitting induction of abortion 37
    Methods of induction
      By catheter (self-inserted or by midwife) 30
      By physician 4
      Elm stick 3
Average number of days aseptic patients remained in hospital.............. 7
Average number of days septic patients remained in hospital 20
Treatment 530
    Packing 381
      Packed once 318
      Required repacking 81
      No packing required 131
    Curettage 18
Average number of days in hospital after curettage 9
Temperature of these patients was irregularly intermittent, not going higher than
    100° in 14 cases and reaching 101° or above in 4 cases

Cases readmitted because of bleeding 3
Curetted after readmission 2

Follow-up Work on 100 Consecutive Conservatively Treated Cases
(From this series of 530 cases)

100 patients were visited by a Social Service worker and examined by a member of
    Bellevue House staff after patient's discharge from the hospital.
Discharged, up and about, without bleeding 81
Discharged, with slight bleeding and pessary 19
When visited at a period of not less than two weeks after discharge
No bleeding 80
Slight bleeding (menstrual type) 17
Profuse bleeding (more than menstrual) 3

It seems permissible to draw the following conclusions from these data:

1. All cases of abortion, threatened, inevitable or incomplete should be treated conservatively until it is demonstrated that conservative treatment has failed.

2. Conservative treatment, properly executed, will fail in something less than four cases out of one hundred.

3. The mortality and morbidity in abortion cases is in direct ratio with the degree of intrauterine interference. The more the manipulation and interference, the higher the mortality and morbidity.

4. Curettage in abortion transposes many aseptic cases into septic cases.

5. Curettage, therefore, is not only seldom indicated, but is often actually harmful.

6. Conservative treatment has, if possible, a more positive indication in septic than aseptic cases.

71 HALSEY STREET.

Society Transactions

AMERICAN GYNECOLOGICAL SOCIETY. FORTY-SIXTH
ANNUAL MEETING HELD IN SWAMPSCOTT,
MASS., JUNE 2, 3, AND 4, 1921

(Continued from October issue)

DR. FREDERICK TAUSSIG, of St. Louis, presented a paper on **Development of the Hymen**. (For original paper see page 471.)

DISCUSSION

DR. W. BLAIR BELL, LIVERPOOL, ENGLAND (by invitation).—The problem, as it presents itself to me, resolves itself into two divisions, namely, is the hymen a new formation, or is it the remnants of a disappearing structure? Dr. Taussig says it is a new formation. I presume that he means that it is an overgrowth of connective tissue produced when the labia are developed at the roof of the external cloaca. It is impossible to discuss this subject properly without going into a good deal of comparative anatomy, not only of the internal but also of the external cloaca. This I cannot do now.

Dr. Taussig refers to the prominence of the hymen in the higher apes and in the human subject, but I differ from him when he says that this structure does not exist in the lower animals. It does, but it is not apparent because the urogenital sinus in the lower orders of mammals is long, and the hymen is at the top, at the junction of the urogenital sinus and vagina. The hymen is well developed in such an animal as the horse, but because it is situated high up it cannot readily be recognized.

Dr. Taussig referred to the papers I have written in connection with abnormalities in this region. I think I have myself shown definitely that the so-called hymenal occlusion is nothing of the sort. It is an occlusion of the lower end of the vagina, and in 60 per cent of cases almost invariably the lining membrane on the inside of these occlusions is columnar in part or entirety. One finds, in fact, a number of specimens in which there is columnar epithelium on the inside and squamous epithelium on the outside. It is interesting, too, that there can be found on the occluding membrane traces of the hymen, and in these remnants squamous epithelium is seen on both sides. Absence of the hymen is rare, and when it does occur it is my belief that there has been total instead of partial disappearance.

I am at present of the opinion that the hymen represents the remains of what we call the urogenital plate, that is to say, the anterior portion of the original cloacal membrane, which becomes divided by the urorectal septum into two parts. It is important to remember that whereas the vagina comes down from above and leads to central or partial disappearance of the urogenital membrane, the rear part of the cloacal membrane, which covers the site of the anus, is depressed upwards (or inwards) to meet the hind gut; consequently in the former a remnant is left, while no trace of the posterior part of the cloacal membrane in the region of the anus is apparent.

It is a very important matter that there are so many varieties of hymens. A

cribriform hymen is what might be expected in a disappearing structure, not in a structure newly-formed in every case.

These are just arguments I present against Dr. Taussig's thesis to make the matter more interesting, for, as I have said, I cannot at present absolutely decide that the hymen is the remnant of the disappearing urogenital membrane as opposed to the view that it is a new formation.

DR. TAUSSIG (closing).—I am sure there is neither time nor would the members be especially interested in the pros and cons of the theories regarding the development of the hymen. In the time allotted I was able to present only a portion of the evidence obtained from the study of the serial sections in my twenty embryos. Certainly this evidence points strongly in favor of the development of the hymen as an actively proliferating connective tissue process rather than an obliteration membrane, either cloacal or vulvovaginal.

DR. JOHN A. SAMPSON, of Albany, New York, read a paper entitled, **Perforating Hemorrhagic (Chocolate) Cysts of the Ovary,**[*] calling attention to their importance and especially their relation to pelvic adenomata of endometrial type, (adenomyoma of the uterus, rectovaginal septum, sigmoid, etc.) The following is the author's abstract:

Perforating hemorrhagic cysts of the ovary occur most frequently in women between thirty years of age and the menopause. In the twenty-three cases reported in this paper only two were under thirty and I have never found one in a woman after the menopause. It is quite a common condition, probably occurring in nearly 10 per cent of the women of the above age limits who require abdominal operations for the relief of pelvic disease. During the year May 1, 1920, to May 1, 1921, I found perforating hemorrhagic cysts of the ovary in fourteen of one hundred and seventy-eight patients between thirty and fifty years of age who had an abdominal operation for some disease of the pelvic organs.

The cysts are usually small, between two and four centimeters in diameter, occasionally less than two and also occasionally larger than four centimeters. They are quite frequently bilateral, as in eight of the twenty-three cases.

At operation the cyst or ovary is found to be adherent and in freeing it the "chocolate" contents escape because a previous perforation, which had been sealed by whatever structure the ovary had become adherent to, is reopened. Adhesions, due to the "irritating" action of the material which had previously escaped from the ovary, are always present and these vary greatly in location, density and extent. They may be found in any of the natural pockets and folds of the pelvis where such material would be apt to lodge and especially in the culdesac. When slight they simulate the adhesions resulting from pelvic peritonitis of tubal origin, on the other hand the adhesions in the culdesac may be accompanied by such a marked reaction as to resemble malignancy.

The histologic findings in these cysts vary in different specimens and in different portions of the same cyst. In discussing their life history I prefer to state "possibilities" at the present time, reserving a fuller presentation of the subject until I have had the opportunity to study more material. There may be several varieties of cysts but I am more inclined to believe that the apparently different kinds represent various stages in the development and retrogression of one type of cyst and

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also various phases of its menstrual cycle. The initial perforation may have been the rupture of an "endometrial" graafian follicle or atretic follicle hematoma; or following ovulation an abnormal corpus luteum may have developed, due to the invasion of "endometrial tissue" present at the site of rupture. One group of these perforating hemorrhagic cysts shows the following conditions; a portion of the hematoma, usually the deeper, is lined by a "luteal" membrane the exact origin of which I have been unable to determine in every case. The rest of the cyst, usually towards the perforation, is apparently being relined by the invasion of epithelium, through the perforation, from epithelium situated in the periphery of the ovary at the site of rupture. This epithelial relining or regeneration is of endometrial type both in structure and in function. With the advance of the epithelial invasion the "luteal" membrane retrogresses and eventually the entire cyst may be relined by this epithelial tissue. This group represents either the development of an endometrial cyst from the invasion of a follicular hematoma by misplaced "endometrial" epithelium or else it *represents the regeneration of an "endometrial" cyst after a hemorrhage (menstrual)*. Another group apparently represents either an earlier or a later stage of the former. The cysts in this group are entirely lined by epithelium, low, cuboidal or columnar; all three types of epithelium are often present in the same cyst. Usually there is a vascular cellular stroma not unlike that of the endometrium, between the epithelium and the ovarian tissue. This stroma varies greatly in thickness and in some instances may be very thin or even lacking in places; structures, like uterine glands, may be present in this stroma and these are usually most numerous near the site of the perforation. The entire cyst is like the epithelial portion of the cysts described in the first group and all gradations between the two groups may be found.

The exact counterpart of the epithelial lining of these ovarian hematomata may be found in the uterine hematomata often occurring in adenomyoma of the uterus and apparently due to the retention of menstrual blood. Tissue of "endometrial" type is also present in pockets in the periphery of the ovary about the perforation and the tissue in these pockets may resemble normal endometrium more closely than that lining the meatoma in the same ovary. The histologic study of these hematomata shows that periodic hemorrhage occurs similar to that of menstruation. I have come to the conclusion that these ovarian hematomata are of endometrial type just as are the uterine hematomata found in adenomyoma of the uterus.

I have never found these cysts in women after the menopause and some that I have found were small and apparently retrogressing rapidly. In two instances where I found adhesions with adenoma of endometrial type in the pelvis, but no gross evidence of these cysts in the ovaries, pockets were found in the periphery of the ovaries lined by columnar cells and a cellular stroma resembling endometrial tissue. I interpreted these pockets as the possible remains of a perforating hemorrhagic cyst in which nearly complete retrogression had occurred. For the above reasons I have concluded that their life cycle may sometimes be of "short" duration and the "characteristic" adhesions resulting from them may persist long after the cyst has disappeared.

The adhesions form equally as interesting a pathologic study as the cysts themselves because adenoma of endometrial type is present in the tissues involved by the adhesions in a large percentage of the cases. I have studied histologically the tissues involved by the adhesions outside of the ovary in fourteen of the twenty-three specimens and *adenoma of endometrial type was found in thirteen*.

Sometime, or possibly many times, in the life cycle of these hematomata, material including epithelial tissue and blood ("menstrual") may escape into the peritoneal cavity from the hemorrhagic cyst or from the "endometrial" pockets in the ovary about the site of perforation and, lodging in the natural pockets and peritoneal

folds of the pelvis, causes adhesions. Adenoma of endometrial type often develops between the adherent folds of peritoneum thus resulting. These adenomata may be small, and quiescent or they may be invasive. *If invasive they may cause "adenomyoma" of the uterus by invasion of the uterine wall from "without" or "adenomyoma" of the utero sacral ligament, round ligament, recto vaginal septum, rectum, sigmoid, etc., namely, whatever structure or organ is invaded by the adenoma arising from the "infective" contents of the cyst or ovary lodging on its surface.* The question naturally arises, in what way does the content of the cyst or ovary cause the development of these adenomata? Is it due to some "specific" irritant present in the cyst contents which stimulates the peritoneal "endothelium;" thus causing a metaplasia and the development of endometrial tissue typical both in structure and in function? Some may claim that dormant "endometrial" epithelium may be present in the tissues soiled by the contents of the cyst and this is stimulated to further growth. *It seems to me that the condition found in many of these specimens is analogous to the implantation of ovarian papilloma or cancer on the peritoneal surface of the pelvis from the rupture of an ovarian tumor containing these growths.*

I offer the following as evidence that perforating hemorrhagic cysts of the ovary are hematomata of endometrial type:

1. These hematomata, as the uterine mucosa, manifest their "activity" during the menstrual life of the patient.

2. Histologically the epithelial lining of the ovarian hematomata is similar to that of the uterine hematomata, due to the retention of "menstrual" blood, often present in adenomyoma of the uterus.

3. Periodic hemorrhages occur in the ovarian hematomata which are similar in gross and histological appearance to that of menstruating endometrium.

4. The "chocolate" contents of the ovarian hematomata resemble old menstrual blood.

5. In two patients operated upon at the time of the menstrual period, one the day that menstruation was due and the other the last day of menstruation, the histological changes in the ovarian "endometrial" tissue corresponded to the phase of the menstrual cycle indicated by the menstrual history of the patient.

6. The fact that material escaping from the ovarian hematomata may give rise to the development of adenoma of endometrial type in the tissues thus soiled is further proof that these hematomata contain endometrial tissue.

I cannot state that these ovarian hematomata of endometrial type are the only cause of ectopic pelvic adenomata.

These ovarian hematomata with their secondary peritoneal "implantations" are a pathologic entity as definite as that of ovarian papilloma and cancer. They are likewise a definite clinical entity which is capable of diagnosis before operation in a large percentage of the cases.

DISCUSSION

DR. RICHARD R. SMITH, GRAND RAPIDS, MICHIGAN.—I cannot discuss Dr. Sampson's paper from the standpoint of a pathologist, but must do so simply from that of a clinician.

I became interested in this class of cases about a year ago, at which time I made a study of hemorrhages occurring in the pelvic cavity exclusive of those resulting from ectopic pregnancy. Exclusive of tubes, the seat of pregnancy, the most constant source of hemorrhages in the pelvic cavity is the ovary, first, those occurring from normal graafian follicles, and second, those occurring in ovarian tumors the subject of traumatism or twisting, and third, an interesting group which has troubled us all as to etiology and has masqueraded under the head of hematoma ovarii. We have all met this condition frequently and have been puzzled by it.

It is commonly associated with some other pathologic condition of the pelvis, principally myomata.

Dr. Williams in discussing my paper last year before the Society stated that a special study should be made of these cases, since we have, as clinicians, recognized the fact that they form a definite clinical group. It has remained for Dr. Sampson to clear this matter up, and I am sure that gynecologists are grateful to him for having done so. We shall now recognize them as a definite, clinical, pathologic entity, and we shall approach the clinical side of the subject with new interest.

Just how we are to formulate our operative procedures, just what the indications are going to be in dealing with this condition, I think it is a little early to say, but we must bear in mind two things, one of which is, that we are dealing with a neoplastic disease, a disease which is capable of recurrence and further progress, and which may have within it serious future consequences to the patient. In the second place, we are dealing with a disease which apparently shows signs in its life history of retrogression; that is, the process may regress and disappear. Tentatively, I may suggest that we regard them as follows: we must consider those cases complicated by myomata as serious and deal with them radically. In others a more conservative course might well be followed.

DR. N. SPROAT HEANEY, CHICAGO.—I have wondered at the strength of the adhesions binding the ovary to the neighboring structures. Dr. Webster, in his study of ectopic pregnancy, advanced the theory that the pregnancy can only occur in tissue capable of undergoing decidual reaction. Therefore, for many years he doubted the occurrence of true ovarian pregnancy. Later he had two undoubted cases of ovarian pregnancy and then admitted their possibility, but could not correlate his decidual reaction theory with their occurrence. Dr. Sampson has found endometrial-like tissue in the ovary which after all proves Dr. Webster's decidual reaction true. Dr. Sampson has undoubtedly satisfied himself regarding one point concerning which I should like to inquire, namely, whether the endometrial tissue in the ovary is primary and the adenoma in the uterus is secondary to rupture of the cyst, or whether the ovary becomes infected by the endometrial tissue because it becomes adherent to the surface of the adenomyoma. I do not quite understand why the first possibility was accepted and why the second was ruled out of consideration.

DR. EDWARD H. RICHARDSON, BALTIMORE, MARYLAND.—I have seen a few of these cases myself, and certainly it is most satisfactory to have had this convincing proof brought forward as to the origin of these cases of adenoma of the rectovaginal septum and in other scattered tissues of the pelvis. It is remarkable and surprising to me to learn of the frequency of endometrial tissue in the ovary, and in view of this fact I must confess that I am puzzled to know how best to deal with this condition clinically, not only because it occurs apparently in the period of maximum fertility, but also from Dr. Sampson's contribution I got the impression that it very commonly is bilateral. All of us who have had to deal with adenomyoma of the rectovaginal septum know what a serious matter it is. If you have had the opportunity to observe any of these cases to the end, you know that this tumor is essentially a malignant one. It will invade the adjacent pelvic structures in very much the same way as carcinoma, and if you attempt, as I have done in one instance, to remove that tissue from the rectovaginal septum, either by the abdominal or vaginal route, you will find yourself face to face with a most serious and radical operation. I do believe in most instances it cannot be successfully removed unless you are willing to face a procedure of the first magnitude, and even then, in the light of this contribution, you would probably have a recurrence unless you also remove the ovaries. Since I have been reliably informed that radium

is ineffective in the treatment of adenomyoma, from our present viewpoint it looks as if one has to choose between hopelessly advancing growth and the removal of both ovaries during the child-bearing period in a condition which is by no means rare.

DR. RALPH H. POMEROY, BROOKLYN, NEW YORK.—As an incidental contribution to this discussion, I want to call attention to the history of a case that is now four years old. I had occasion to do a cesarean section on a young woman for a dermoid in the pelvis which was associated with a breech presentation. After the removal of the dermoid tumor, with a successful cesarean section, closing the incision in the ordinary way, a year following the patient came back complaining bitterly of pain in the abdominal wound, which was aggravated at the time of menstruation. I observed her through the menstrual periods and found a definite mass in the middle of the abdominal wound which between menstruation would subside, but it remained as a hard nodule. I insisted on operation, but she objected for six months. Finally I got her to consent to an operation. I told her I would not take out the uterus or sterilize her. I excised the abdominal scar, including the mass and a wedge from the top of the uterus, which was densely adherent to the abdominal wall. The tissue removed was submitted to a pathologist for examination, who reported adenomyoma. The woman has had no symptoms since and reports herself well. I thought I would add this case to the peculiar histories of hemorrhagic problems associated with adenomyoma in the menstruating woman.

DR. HUTCHINS.—I would like to ask whether these tumors can be diagnosed previous to operation fairly successfully by the character of the menstrual pain when it occurs and the time it occurs?

Dr. G. BROWN MILLER, WASHINGTON, D. C.—Since Dr. Cullen called attention to adenomyoma of the rectovaginal septum, I have had four cases. In two of these there were tumors in the sigmoid as large as those described by Dr. Sampson. One was operated on by Dr. Cullen, and I do not know whether he examined the tissue from the tumor surrounding the sigmoid or not. The case I operated on proved fatal. We could not get an autopsy, and the tissue surrounding the sigmoid was not removed, so that we do not know the nature of the growth.

I think Dr. Sampson's contribution is a most valuable one. The only difficult part to understand is in the cases where there was a tumor of the sigmoid, was that the tumor was not in contact with the adenomyoma of the rectovaginal septum or the ovaries. There were no adhesions of the bowel to the growth or to the ovary, and it would seem highly improbable that with the sigmoid separated so far from the chocolate cyst, it would lead by implantation to a well developed tumor of the bowel.

A case I have recently seen, answers Dr. Hutchins' question as to the symptoms in cases of adenomyoma of the rectovaginal septum. A woman complained of intense and persistent pain during the menstrual period, which would gradually subside and disappear ten days after the menstrual period had ceased. At the same time, she had definite symptoms of partial obstruction of the lower bowel. Evidently to my mind the tissue in the rectovaginal septum during menstruation caused pressure on the rectum to such an extent as to produce temporary partial obstruction of the bowel. As the menstrual period subsided, so the bowel symptoms subsided. It suggested a line of treatment that would give relief. The most difficult cases I have ever tried to operate on have been the two cases of this nature. The method of treatment which suggested itself was to sterilize the woman by the x-ray or radium. The last case I had had no pain except at the menstrual period, evidently due to the tissue which took part in menstruation, and if we prevent menstruation (in view of the great risk of removing the growth) I believe it would be the logical method of treating these cases. Dr. Cullen, however, to whom I wrote

concerning this case, said he had had two cases in which the ovaries had been removed along with the uterus, and in which the growth in the rectovaginal septum had subsequently progressed, causing another operation.

DR. JOSEPH L. BAER, CHICAGO, ILLINOIS.—Dr. Sampson showed us hemorrhagic cysts that are adjacent to tissue in which we are accustomed to find adenomyoma of the uterus or rectovaginal septum. I should be glad to know whether the doctor has met with cases in which perforating ovarian cysts are in contact with tissue remote from the uterus or rectovaginal septum, and whether he has found any such adenomyoma in such remote tissue.

DR. CAREY CULBERTSON, CHICAGO.—Dr Sampson's demonstration would appear to clear up in a measure the difference of opinion found to exist in the literature relative to the origin of this type of tumor. Since Lockyer's first report of a tumor of this nature and that of Stevens' six cases in 1915, these tumors have been accepted as neoplasms, but in the German literature we find similar growths described as products of inflammatory reaction. Bartkiewitsch regarded them as muscle hyperplasias and used the term "adenomyometritis;" Amann used the term "retrocervical fibroadenomatous serositis," and Myer "adenomyositis uteri et recti." Stevens and Cullen have insisted that these tumors are true neoplasms, though usually bound up with extensive and dense adhesions, and it is this latter condition which is now explained so ably by Dr. Sampson, together with what would appear to be proof that these growths are true neoplasms. We now see that certain ovarian cysts may contain tissue identical in type with that of the mucosa of the uterine body, that such a cyst may spill its contents into the pouch of Douglas and give rise not only to proliferation of the adenomatous structure but to the formation of dense adhesions.

DR. WALTER WILLIAM CHIPMAN, MONTREAL, CANADA.—When Dr. Sampson refers to endometrial tissue in the ovary, he uses that merely as a descriptive term. He does not mean the endometrium is in the ovary because genetically the two tissues of the müllerian tract and ovary are different.

I would like to ask another question. Would not the cellular spill from such a cyst thrown down into the pouch provide for the epithelium which we find in these glandular acini and the fibrous and muscle tissue by the reaction from this secretion?

DR. SAMPSON, (closing).—In answer to the questions which have been asked, I believe the growth is primary in the ovary, and not in the adenomyoma, and that the extension is from the ovary to the uterus and not from the uterus to the ovary. Cases have been reported in which adenomyoma was adherent to the ovary and the adenomyoma invaded the ovary. I think these cases might also admit of a reverse interpretation. In several of my cases the perforating hemorrhagic cyst of the ovary was not in contact with the growth in the culdesac, and I have some slides in which there were many adenomatous growths in the pelvis. The contents of the ovary had apparently escaped into the pelvis, and the adenomatous growth was found in the vesicouterine reflection of the peritoneum, around the round ligament, between the tubes and the ovarian ligament, and also in the culdesac, i.e., in any pocket in which such material would likely fall. Just exactly as in papilloma of the ovary these pockets may contain papillary implantations.

The question has also been asked, are all cases of adenomyoma of the rectovaginal septum and other ectopic adenomyomata, associated with perforating hemorrhagic cyst of the ovary? I cannot answer this question. The literature on the subject is not of very much value in determining this point, because the men who have reported ectopic adenomyomata were apparently more interested in the adenomatous growth than they were in the condition of the ovaries. In my own ex-

perience all the definite cases of ectopic adenomyomata were associated with these cysts. I have had two cases in which there were small nodules in the culdesac which I excised, and histologically it was difficult for me to determine definitely whether they were adenomyomata of endometrial type. I thought they might be. I examined the ovaries in these two cases, but could not find any gross evidence of these cysts. Hysterectomy was necessary in both cases, and the uterus was removed together with the ovaries. In each instance on examining the ovaries microscopically spaces were found lined by columnar epithelium and stroma resembling endometrium which might have been these cysts that had almost completely retrogressed. I believe these ovarian hematomata passed through a process of development, followed by one of retrogression, so that the smaller ones might almost entirely disappear. I do not wish to speak more about this phase of the subject because my views are not definitely formulated, and I am afraid I might say something which may not be true, even though I believe them at the present time; I wish to reserve such remarks until I know more about the subject.

I think it is possible that we may find ectopic adenomyoma without any gross evidence of these cysts, and yet they may come from these cysts primarily or from pockets in the ovary containing tissue of endometrial type. In other words, ectopic adenomyoma may persist long after the cysts or ovarian condition has disappeared.

Dr. Hutchins asked about making the diagnosis from the history and from the physical signs. Dr. Richardson and Dr. Miller have spoken about advanced cases. The latter are the exception. The less extensive cases are much more common. The history varies greatly. In the moderately advanced cases pain is often present, but there is nothing characteristic about the pain unless there is involvement of some such structure as the rectum, as brought out by Dr. Miller. I think, however, acquired dysmenorrhea of short duration and of the progressive type is a fairly common symptom.

In regard to the physical signs, the advanced cases resemble malignancy. In moderately advanced cases, it is possible to make a diagnosis. In the cases I reported tonight, 23 in number, I believe it was possible to have made a diagnosis before operation in one-half of them, but I did not do so. However, in the last year, I have made a diagnosis in about half of them before operation. We are able to make a diagnosis of a malignant ovarian cyst from the following physical signs; the ovarian cyst is adherent and we may also find involvement or implantations in the culdesac. If we find those two signs, I believe we are dealing with a malignant ovarian cyst. In the condition under discussion, we find an adherent ovary which feels like an adherent cystic ovary or a hydrosalpinx. In addition to that, we may feel a localized induration in the culdesac which is often nodular and does not resemble the conditions resulting from chronic pelvic inflammatory disease. When we find this combination of physical signs in a woman between thirty years of age and the menopause (often coupled with a retroflexion of the uterus) we can make a pretty reasonable diagnosis of this condition.

Its treatment is still in the experimental stage. I cannot help but think, from my own experience, that ovarian conservatism is a rather dangerous experiment. Of three cases, I operated on over a year ago in which I removed one ovary, I have operated on one since and two I have examined lately. In one of the latter I could feel an adherent enlarged ovary on one side and induration in the culdesac between the rectum and the uterus. I believe that the remaining ovary has caused a continuation of the growth already in the culdesac, or possibly in freeing the ovarian hematoma removed at the time of the operation I was responsible for causing the escape of the contents of the cyst and its subsequent growth in the culdesac. The other case showed a somewhat similar condition, but not so marked.

Dr. Culbertson brought out a very interesting point. There has been considerable written on the so-called inflammatory origin of adenomyoma in which is advocated a

belief that adenomyoma may arise from the irritation of the peritoneum so that the endothelium is converted into tissue which is histologically similar to endometrium, and not only that, but may function as such. These writers would consider the work which I have done as confirmatory of their views. It seems to me that it is more analogous to the implantation which occurs from a ruptured ovarian cyst containing papilloma or cancer than a metaplasia of the endothelium of the peritoneum arising from some specific irritant in the contents of this hematoma.

Dr. Chipman spoke about endometrial tissue in the ovary. I prefer to speak of it as tissue of endometrial type.

DR. CHIPMAN.—My question was, would not the cellular spill from such a cyst thrown down into the pouch provide for the epithelium which we find in these glandular acini and fibrous and muscle tissues, by the reaction from this secretion?

DR. SAMPSON.—I believe it would. The spill of the cyst carries with it the epithelium which lines it or is situated in the periphery of the ovary at the site of perforation. This epithelium we find in many instances invades the surrounding tissue without reaction on the part of the tissue, and when a reaction takes place, it is not that of a true inflammation, but a hypertrophy of the muscle and of the connective tissue just as we find in an ordinary myoma. It is an extension of this epithelium from the peritoneal surface of the uterus into the uterine wall. I showed in one section in which the growth had invaded the uterine wall that there was no characteristic uterine stroma about it near the surface, but as it extended deeper the characteristic uterine stroma developed around the invading adenomyoma suggesting that the stroma in this instance was derived from the tissue which was invaded and not carried by the growth. I think in some instances pieces of tissue containing both glands and stroma may become deposited in the culdesac and there develop, as I expect to show in another communication.

Dr. Arthur Curtis, of Chicago, read a paper on **Bacteriology and Pathology of Fallopian Tubes Removed at Operation.** (The following is the author's abstract.)

This study indicates that gonorrheal infection is responsible for at least three-fourths of all inflammatory lesions of the fallopian tubes. Infection with various types of streptococci has been second in frequency. Tuberculosis, exclusive of generalized tuberculous peritonitis, ranks third. Infections with other bacteria, notably those of the colon group, have been less common and less important. With the exception of a few streptococcus infections, bacteria have not been isolated from tubes which fail to show grossly active inflammation. Just as gonorrheal endometritis seldom becomes chronic, so it appears that gonorrheal infection of the tubes runs a quickly self-limited course. While it has long been known that gonococci soon disappear from the tubal mucosa, it is of interest to learn that modern cultural methods fail to yield growth when the entire diseased tube is thoroughly ground and inoculated into culture media, provided two weeks have elapsed since temperature and leucocyte count returned to normal. This test has been performed repeatedly and with unvarying results. We therefore feel warranted in the conclusion that the fallopian tube is not a focus for chronic gonorrheal infection. Unfortunately this does not exclude the danger of repeated infection from without, or recurrent invasion of bacteria from the chronically infected lower genital tract.

The present study sustains previous experience that the colon bacillus does not cause serious tubal disease. Bacillus coli is particularly frequent in tuboovarian abscess of large size. As a primary cause of salpingitis it appears to be of little

importance. A survey of the pathology encountered in these tubes emphasizes that gonorrheal infection primarily involves the tubes, with resultant thickening, nodulation, closure of the fimbriated ends, and pelvic adhesions which are amenable to separation by blunt dissection.

In streptococcus infection tubal involvement is usually but a part of the picture. Perisalpingitis is the most frequent type of tubal lesion, although typical salpingitis, notably hydrosalpinx, occurs with moderate frequency.

Tuberculosis is very likely to be overlooked if routine histologic preparations are not made. When limited to the pelvic organs it is difficult to establish a diagnosis from the gross appearance alone. Unusually resistant adhesions suggest tuberculous or streptococcus infection.

Somewhat similar operative measures appear indicated in streptococcus and in tuberculous salpingitis. In both diseases infection is not usually confined to the tubes; in both, viable bacteria are often still present in the tissues and there is danger of chronic postoperative infection of the ovaries. It is not my desire to suggest definite rules for operative procedure, but with the possible exception of the cervix, and particularly in regard to extirpation of the ovaries, more radical surgery appears indicated than in gonorrheal infections of corresponding severity.

DR. WILLIAM A. SCOTT, of Toronto, Canada, read by invitation, a paper on **Hemorrhage from the Nonpregnant Uterus in the Absence of a Neoplasm.** (For original article see page 479.)

DISCUSSION

DR. JOHN A. SAMPSON, ALBANY, NEW YORK.—I think Dr. Scott's paper is a valuable contribution in showing that there is no constant histologic change to account for such bleeding. We appreciate that bleeding from the uterine cavity, in the absence of a new growth, indicates, in the first place, some injury to the endometrium, and second, that the musculature of the uterus is not sufficiently contracted to shut off the venous channels which convey the blood from the venous endometrial plexus to the deeper plexus in the uterine wall. That is very well brought out in connection with curettement of the uterus. When we curette the uterus we remove endometrium, and while there is relaxation there is profuse hemorrhage from the cervix. Afterwards, even though the endometrium is still removed, provided the uterus is contracted, bleeding does not occur, so that I think we must look upon many of these cases of uterine bleeding, whatever the cause may be as due to something which prevents in some way the normal contractility of the uterus by which it can properly control its venous circulation. As long as the uterus contracts, it is impossible for the venous blood to escape into the uterine cavity, and it is venous blood that escapes.

DR. WILLIAM S. STONE, NEW YORK CITY.—I have studied this condition carefully in the laboratory, and I can confirm the statement Dr. Sampson has just made. The only condition in the uterus that seems to be at all constant is the relative disproportion of the muscle and fibrous connective tissue. That was not altogether constant, but the most constant histologic feature I was able to determine. I have always thought the muscle insufficiency as it is developed more or less accounted for the bleeding, and it accounts for the bleeding also in those rather infrequent cases in young women as well as in the older.

DR. CAREY CULBERTSON, CHICAGO.—From the abstract of Dr. Scott's paper given in the program, I infer that he regards the origin of this hemorrhage as probably ovarian. There is much evidence that the bleeding is due to ovarian dys-

function, whatever that means, but I firmly agree with Dr. Sampson that flaccidity of the uterine wall, which he brought out so well in his work on fibroids, is largely accountable for the hemorrhage. Whether this lack of tone is present when these organs bleed, hence due to organic fault, or whether a functional disturbance of the ovary exists unfortunately cannot be demonstrated by section of the post-mortem tissues. The whole subject brings up the treatment, which today is provided for in a variety of ways. Should the uterus be taken out since we have radium? These hemorrhages have been stopped temporarily by radium. Many of these menstrual disturbances can be corrected very nicely by endocrine treatment. I have given extract of the whole pituitary body in two grain doses in some of these cases where the uterus seemed to be clinically normal, with very satisfactory results.

DR. SCOTT, (closing).—I can only bring out the one iconoclastic point which is my opinion, namely, that none of the local histologic findings in the uterus can be taken as the ultimate cause of this type of bleeding. It is my own opinion that the cause of the bleeding is endocrine, likely ovarian, and I quite agree with what the last speaker (Dr. Culbertson) said, that more and more we are going to get away from surgery in the treatment of these cases. A few of them respond to endocrine treatment, but that must be regarded as more or less empiric. The use of whole pituitary body is sometimes successful, so is sometimes the administration of thyroid, but one can with absolute assurance guarantee the patient a cure in these cases by the proper use of either radium or x-ray, and it makes no difference which is used. One can get just as successful results from the use of one of these agents as from the other. Of course we must eliminate the possibility of neoplasm in the body of the uterus. In the last year and a half in the service with which I am connected, we have treated nearly all these cases by the use of the x-ray as we did not have sufficient radium at that time.

DR. THOMAS J. WATKINS, of Chicago, read a paper on **Ovulation and Menstruation as Postoperative Considerations**. (For original article see page 489.)

DR. FREDERICK C. HOLDEN, of New York, read a paper entitled **Radical Conservatism in the Operative Treatment of Chronic Adnexal Disease**. (For original article see page 493.)

DR. CAREY CULBERTSON, of Chicago, read by invitation, a paper entitled **The Disposition of the Uterus Following Salpingectomy Where It Is Desirable to Preserve Menstruation**. (For original article see page 497.)

DISCUSSION ON THE PAPERS OF DRS. WATKINS, HOLDEN, AND CULBERTSON

DR. WILLIAM P. GRAVES, BOSTON, MASSACHUSETTS.—Dr. Watkins' excellent paper brings up the consideration of the matured ovary in its rôle as an apparatus for reproduction and in contrast to the other glands of internal secretion, even including the testicle, its comparative lack of importance to the general organisms of the women.

I should like also to discuss the very important question of the relationship between ovulation and menstruation, and to show the necessity for harmony between these two functions. I should like to show, for example, the danger to

a patient's nervous organization that may attend such disharmony as sometimes follows operations that allow for ovulation but prevent menstruation or when deficient activity in one or both functions is produced by mutilation of the pelvic organs. It would be interesting also to discuss the ovary as an organ of internal secretion from the standpoint of the specific tissue in which the secretion is probably elaborated, and the bearing which this has on the subject of ovarian therapy.

I shall confine myself, however, to one statement made by Dr. Watkins which, if I read it correctly, is to the effect that the writer has never noted the serious changes, such as adhesions and cystic degeneration that are claimed to occur in ovaries that have been left *in situ* after hysterectomy. In answer to this statement I have brought with me a few specimens, the histories of which I will recount.

The patient from whom one of these was taken is now in the hospital having been operated on about 10 days ago. I had intended to keep this case over until next week and invite Dr. Watkins to be present at the operation, but the symptoms were so severe that I could not wait. The patient was first operated on last September by a surgeon in a neighboring city. The operation was for a pelvic inflammation of gonorrheal origin. A hysterectomy was performed, the right ovary being left *in situ*. After the operation the patient had very severe hot flushes and troublesome molimena at the times of her regular periods. In the course of time the nervous manifestations at the time of the periods took the form of spasmodic muscular twitchings, and violent hiccoughs. Of late the spells of hiccoughs had not been confined to the times of the menstrual periods, and were becoming more and more frequent. Examination of the patient about a month ago revealed a young woman of 25, very pale, and hysterical. In the pelvis was a cystic ovary on the right about the size of a mandarin orange. The operation consisted of the removal of an extremely adherent cyst with involvement of the neighboring coils of intestine. The contents of the cyst were of the chocolate variety. Since the operation the patient has had no hiccoughs though previously she had had five or six spells daily. She has been entirely placid during the convalescence. Hot flushes have continued about as before.

In the second case, this cyst was taken from a woman, 27 years of age, who, two years previously had been operated on in New York for pelvic inflammation, hysterectomy having been done with the retention of one ovary. Soon after the operation she began to have dragging sensations in the right side, with occasional very acute attacks of pain. This went on for two years. She came to the Free Hospital for Women and was operated upon by my associate Dr. Pemberton. The cyst was removed, and the patient made a complete recovery.

It is quite interesting to see that there is a small corpus luteum on the surface of the cyst, bearing out Dr. Watkins' claim.

The next specimen consists of necrotic cancerous material. The patient was operated on at the Beverly Hospital. After the operation, on section of the uterus, it was found that there was a carcinoma of the fundus in connection with the fibroids. About a year after the operation, when I saw the patient she was bleeding from the cervical stump. At that time I supposed she was having a recurrence of the carcinoma in the cervical stump. On opening the abdomen I found the right ovary, which had been left *in situ*, a mass of cancerous tissue. This was scooped out by the hand. It was the material which I show you. This case illustrated one of the dangers in operating on fibroids. A considerable percentage of them are associated with adenocarcinoma of the endometrium. We all know that the first metastasis from carcinoma of the fundus is in the ovaries, and that it may occur early. If in operating on a large fibroid, one leaves in the ovary, it is important to cut the specimen open before closing the wound to make sure that there is no adenocarcinoma in the body of the uterus.

There is one other case I wish to report. A patient was operated at the

Massachusetts General Hospital for fibroids of the uterus. Six years later she came to the Free Hospital for Women with a large mass in the abdomen. Operation disclosed a large malignant papillary cystadenoma of the ovary on one side, and on the other a very small ovary in which there was a beginning process of the cystic adenomatous type.

The two second cases illustrate the necessity of care when one operates on fibroid tumors of the uterus, and leaves ovaries *in situ*. The first two cases illustrate the necessity of removing the ovary in cases of hysterectomy for pelvic inflammation. Such ovaries are practically sure to become adherent and cystic as in these two cases, and cause such symptoms as to necessitate an operation that is very much more difficult and dangerous than the original hysterectomy.

DR. EDWARD H. RICHARDSON, BALTIMORE, MARYLAND.—I have been able to settle the indications for conservation of the ovary in my own mind by conceiving the ovaries as having a two-fold function. It seems very clear that if one differentiates the function of the ovary as regards menstruation and reproduction on the one hand, and then the function of the ovary in its relation to the whole endocrine system on the other, he can get a thorough conception of the advisability of retaining ovaries when it is possible. We are all familiar with the strong chain of evidence which can be collected to show that entirely outside of that period of the woman's life associated with reproduction, that is, before puberty—and I am not at all convinced that it does not hold true also after the menopause—the ovary has a most important function in the body metabolism. Certainly it has before puberty. So far as I know, there is no evidence at present to prove conclusively that the ovary ceases to function after menstruation has ceased and after the child-bearing period. On the contrary, there is evidence to show there is functional activity in the ovary after the menopause. My own feeling about it is, unless one has a clear indication for removal of the ovary at the time of operation, regardless of the age of the woman, the ovary should be conserved.

The question of what happens to a conserved ovary is a complex one, and I am quite in accord with Dr. Graves in his opinion when, in inflammatory cases, where the ovary is adherent or where it is involved in inflammatory disease, and one can reasonably assume such an ovary will become adherent and undergo cystic degeneration, it had better be removed. But I certainly believe, so far as my observation goes, when one takes hospital statistics and hospital histories and undertakes to determine what percentage of conserved ovaries subsequently undergo cystic degeneration changes and require removal, he will find it difficult in most instances in reading a description of the operation and the condition of the ovary at the time of operation, to determine from the record what was done or what was the condition of the ovary. It is to be remembered that in a very important percentage, the circulation of the ovary is interfered with in the removal of the uterus. If you remove the tube, provided you are not careful to safeguard the anastomosis in the mesosalpinx between the arcuate vessels with the terminal uterine artery, in the removal of the uterus, you cut off the supply of blood which goes to the uterine artery. If you do not stick close to the tube and conserve the collateral circulation by the removal of the tube with the uterus, you cut off the circulation of one-third of the ovary in probably over one-half of the cases. It is not surprising therefore that subsequently such ovaries degenerate, and unless we have a record of not only the condition of the ovary as regards disease at the time of operation, but also have a specific note as to whether the operator improved the collateral circulation and safeguarded it in the removal of the ovaries, we will have a large percentage of degenerative changes in such ovaries. In my own personal experience I have never seen yet a case of subsequent cystic degeneration of the ovary requiring removal, where the ovary was sound at the time of operation and where the tube was conserved.

I feel strongly therefore that the important practical surgical point is to safeguard the circulation by retaining the tubes wherever possible, and I also feel the ovary should be conserved because at present we do not know that the ovary ceases to function in other important respects than that of menstruation and reproduction even after the menopause.

DR. W. BLAIR BELL, LIVERPOOL, ENGLAND (by invitation).—In the treatment of lesions associated with chronic infections in the pelvis, we have the opportunity of showing our faith in, and adherence to, the essential principles of surgery, namely, the removal or repair of diseased structures that are causing symptoms, and the conservation of function. These I hold to be the essential principles of surgery.   •

In regard, therefore, to the various operative procedures employed, I think we must always have these principles in mind. When we do, we find we cannot adopt one operation for every type of pelvic infection. We must adapt our procedures to the lesions present, and take into consideration the causal factors of these lesions.

My own surgical procedures are based on what I believe to be the causal factors of the disease and the lesions that have been produced thereby. If there has been, for instance, an appendicular infection which has sealed the abdominal ostium of a tube, there is no reason in a majority of cases to remove that tube. A salpingostomy is all that is necessary. The lining membrane is uninfected.

When we are dealing with tuberculosis we must take into consideration the way in which the infection has reached the pelvic organs. If there is a general infection of the peritoneum, one always finds, sooner or later, that if the tubes are not removed at the time the fluid is drained away, tuberculous pyosalpinges will be formed. Mayo indeed, has rightly insisted on removal of the tubes at the time the fluid is drained from the peritoneal cavity. In the more latent conditions without acute peritoneal infection it is necessary to remove the whole uterus, for I have seen descending infection start in the peritoneum, go through the tubes and not only involve the cervix, but also the vault of the vagina.

With regard to the more common gonorrheal infections, it is common knowledge that in a large proportion of cases the patient complains of menorrhagia. Associated with these may be a profuse leucorrheal discharge. If the infection be active in the cervix, it is important first to amputate the cervix. Afterwards, in treating a serious intrapelvic infection, I perform the operation which I described in 1913, and which has been mentioned by Dr. Culbertson. In that operation I aim to remove the diseased tubes, which are converted into pyosalpinges, and to remove the fundus of the uterus, because I have shown that on pathologic examination it is frequently found to be deeply infected. In removing the fundus of the uterus I remove the cause of the menorrhagia.

I need not go into the details of the operation which I have published and which many of you practice. I have performed it 125 times. I use it, as I have said, almost entirely for gonorrheal infections.

If I may say so, without having tried it, on general principles I cannot approve of Dr. Holden's operation. He is leaving behind diseased structures. If the case happens to be one of streptococcic infection, there may be trouble subsequently, for as Dr. A. H. Curtis has pointed out, these organisms may remain latent in the tubes for many years. It does not seem to me to be a rational operation, and I would prefer to remove completely badly diseased structures. There is no objection to removing a tube except for the fact, which has already been mentioned, that in removing the tubes which are usually adherent pyosalpinges, it is almost impossible to excise them in such a way as to preserve the blood supply of the ovary. I have given up leaving any ovarian tissue at all, in nearly all these cases. I remove both tubes, the ovaries and fundus of the uterus in one piece. I am not content, however, with that as a functional result. I therefore take a piece of ovary and graft it.

I have grafted ovarian tissue in over 100 cases. We have recently investigated these cases, and we find that we have obtained functional results in over 80 per cent of them. In many, both ovaries had been converted into abscess cavities, containing pus. Under such circumstances I have implanted pieces of the ovaries in the internal oblique muscle alongside a drainage tube, passed through a stabwound at some distance from the median line, yet never has one of these grafts come away, and many of the women are still menstruating.

The ovarian function is a very important one not only in its bearing on reproduction, but also because its secretion is a link between many of the ductless glands.

In my ovarian extirpation experiments, I found considerable changes in the pituitary and thyroid, and I do not believe it is possible to break a chain of such metabolic importance and leave the patient perfectly normal afterwards. By grafting ovarian tissue, we attempt to conserve the essential metabolic functions of the ovary.

DR. CURTIS.—In case an ovary or part of it is grafted, how long is the menstrual function preserved?

DR. BELL.—I now have cases that have continued to menstruate for five years. They have not yet stopped, hence I am not able to answer Dr. Curtis' question.

I hope and trust that it will not go out to England that there is a consensus of opinion among the members of the American Gynecological Society that the ovarian function is of no importance. We had a discussion on ovarian grafting in England not long ago when several gynecologists stated that this was unnecessary work, that the ovary was of no use to any woman. At the close of the discussion, a practitioner rose and said that he had been very much interested in the discussion, inasmuch as he happened to have patients who had been operated on by those who had stated that ovarian function is of no importance, and that these patients were now the bane of his life. (Laughter.)

I do want to emphasize the fact that the ovary is an organ of importance, but that it is unnecessary and unwise in many instances to leave an adherent and infected ovary in the pelvis for it is liable to become cystic and that it is better in such circumstances to remove it and to resort to ovarian grafting. The grafting must be done properly with careful technic.

DR. CHARLES C. NORRIS, PHILADELPHIA.—I believe that the practice of gynecology has been well standardized. The question of ovarian conservation, however, is one on which a considerable difference of opinion exists. Our aim and object, of course, is to cure patients, and I believe the only way to determine this question is to study the end-results in series of cases.

Dr. Clark and I prepared a paper that we were unable to place on the program today. This comprised a study of 232 cases of myomata of the uterus, in some of which the ovaries had been conserved, and others bilateral oophorectomy had been performed. In none of these cases had less than one year elapsed since operation. In other words, we endeavored to determine which set of patients were the most comfortable—those in whom ovarian conservation had been practiced, or those in whom the ovaries had been ablated. In one-third of myoma cases the adnexa are inflamed. A questionnaire was sent to these patients, and I may say, in passing, that this form of inquiry is not a very satisfactory method of determining this subject. There is no single symptom from which women suffer as the result of castration that cannot be simulated by other conditions, and it is only by studying each case individually, noting how soon after operation the symptoms come on, how severe they are, and particularly the type of patient in whom they are present, that one can determine definitely whether or not the symptoms are due to the castration or to some other condition. J. O. Polak, in one of his papers, has insisted that a healthy woman, one free from pain, is far less likely to be neurotic

and subject to the usual phenomena of the artificial menopause than is one who is suffering from some malady. That is undoubtedly a fact. If we can cure a patient of her pelvic symptoms, even if we must perform a double oophorectomy, this is wiser than to conserve an ovary that will subsequently cause trouble. That the ovary without the uterus is a functionating organ I feel sure is true. That the ovary is an unimportant organ I do not believe. The question, in large measure, sifts itself down to whether or not we can conserve the ovary, so that it will not give rise to subsequent trouble. Conserved ovaries may undergo cystic degeneration and cause dyspareunia and various other symptoms.

I believe that in this more than in most operative procedures, surgical judgment is essential. We teach our students at the University of Pennsylvania that in ovarian conservation three essentials are requisite: In the first place, the ovary itself must be in fairly good condition. In other words, it must not be the seat of a disease that will develop after removal of the uterus. Graves has reported cases in which the ovary was the seat of carcinoma, perhaps metastatic in origin. We make it a rule that on removing the uterus it should be opened before the operation is over in order to determine whether or not carcinoma is present. If such is found bilateral salpingo-oophorectomy should be performed. If the ovary is severely diseased, that is, the seat of extensive cystic degeneration, etc., it is unwise to conserve it. It is far better to excise such an ovary than to attempt conservation. Secondly, successful conservation cannot be practiced if the blood supply is interfered with. Such interference will cause the ovary to become edematous and cystic. The third point to be remembered is that the ovary must be left in good position. Therefore, the matter again sifts itself down to the individual equation of the operator and his ability to judge of the condition of the ovary *in situ*. Furthermore, it is largely a question of further study of a series of ovaries in laboratories, in order to determine their condition, and then to correlate the findings with those found at operation, and more especially with the end-results. We know, as a fact, that we can remove ovaries and cure patients. The first question in our questionnaire was, "Have you pain as a result of your operation? Have you been improved or cured, or are you worse since the operation?" In our whole series of cases, and it may have been a particularly fortunate series, 99.5 per cent answered that they had been improved or cured regardless of whether or not the ovaries had been removed. About 20 per cent of our cases were examined by us subsequently, and in these cases the advantage of ovarian conservation was particularly striking. In our entire series, it has not been necessary subsequently to remove an ovary, a fact brought out also by Dr. Culbertson in his paper, read this morning, in which, in some 500 cases, no subsequent operation was necessary. If we operate along lines that will conserve the ovarian blood supply, if we leave the ovary in good position, if we exercise good surgical judgment, it is possible with myomata of the uterus to save a large percentage of ovaries. Our study shows very definitely that these cases were more comfortable subsequently and they did not suffer so severely from the effects of the artificial menopause as did those in whom both ovaries were removed.

Of 261 conserved ovaries, none of which have been operated on less than one year ago, and from that period up to thirteen years, not a single one of the ovaries conserved by us has required subsequent removal. This is a strong argument for ovarian conservation in properly selected cases.

The question of the atrophy which results from bilateral oophorectomy is important, since in many cases this will give rise to considerable trouble following operation. In our clinic we have adopted as a routine the rule that no plastic operations are to be performed for minor degrees of relaxation upon patients in whom a double oophorectomy is required. This is a rule that has been forced upon us as the result of experience.

The question of preserving the menstrual function is also an important one. I believe that there are many women in whom menstruation has a definite bearing upon their subsequent comfort.

DR. JOHN O. POLAK, BROOKLYN, NEW YORK.—The question of conservation of the ovary and that ovarian function is a definite necessity, is one I think we are all agreed upon with the exception of Dr. Graves. The other point is that we have to individualize in each case. For instance, our studies in removal of ovaries in relation to fibroids, and our studies of ablation in pus cases, are very different, and so are our follow-up results. In the first place, we find that a very large proportion of women with fibroids have hypertension, and that the removal of the ovary in these patients increases the hypertension, and while the internist tells us that this hypertension, is an essential hypertension, the patients are not able to bear it, and they are uncomfortable, so that we make a strong effort to conserve an ovary when we remove fibroid tumors of long standing and when we conserve the ovary I do what Dr. Richardson called attention to, to conserve the tube by a technic which I have already published.

In our first series of 300 cases followed up, there were 41 in which we had subsequently to remove the ovary because of symptoms or pathology produced. We then published 132 cases where we had done the radical procedure, and we almost felt that Dr. Graves was right, until these patients came back to us with more marked nervous symptoms and were physical wrecks.

In our last series, we are making every effort to conserve ovaries, and we have so far not had to remove a single ovary which had been retained. I believe that this is due to two facts, namely we are more careful in trying to individualize the particular case, and are more carefully studying the condition of the ovary after we have separated it from its bad associations in pus cases. We are conserving the tube wherever possible, and furthermore, we are doing, since 1912, what Dr. Bell has called attention to, i. e. a partial resection of the fundus of the uterus. If the ovarian circulation can be maintained, and the ovary is primarily anywhere near its healthy state, and is not allowed to drop into the culdesac and get into bad company again, the functional part of that ovary remains for the benefit of the economy.

DR. JOSEPH BRETTAUER, NEW YORK CITY.—I think Dr. Polak as usual has hit the nail on the head and in his concise way has expressed the opinion of nearly all of us. But the gist of this whole discussion and the contents of these papers make me believe more than ever that in inflammatory disease of the adnexa conservatism is more important than the decision to leave or to remove the ovary. When it is necessary to operate for inflammatory diseases, my experience has been that a patient is better off with both tubes and both ovaries out than in.

As to the results, I must say I have not had the material with which Dr. Holden and Dr. Culbertson have had to deal. These cases are rather infrequent with me. The results in my 30 years experience in dealing with these cases are bad where I have tried to conserve a part or the entire diseased ovary. You cannot tell that an ovary is diseased in an inflammatory case by looking at it, and the results when the ovaries were removed were satisfactory. I want to impress upon you that it was the principle of ultraconservatism which guided me in the selection of cases and in the indications for any operative intervention. In the ante-x-ray days I selected 50 cases of fibroids, every one of the patients above 40 years of age, and alternately I removed the uterus and both ovaries in one series, and in the next, if conditions were favorable, I removed the uterus alone and left the adnexa. Five years after that I had to follow up these cases. In the 37 cases the postoperative condition was slight, was minimal, giving me the impression that it would not make any difference if I left the appendages or not. Again, these patients were all above 40. Since

the x-ray days I have learned to restrict the indications for x-ray treatment of fibroids to women above 40. The artificial menopause is more stormy when they are young, and the ovaries are removed.

DR. ARTHUR H. CURTIS, Chicago, Illinois.—In all this discussion concerning pus tubes I hope we do mean a chronic or prolonged infection of the tubes, because we all know pus tubes should not be operated on in the acute stage.

In what Dr. Graves has said concerning removal of the ovaries, he has hit on one point of considerable interest and importance, if one diseased ovary or only part of one diseased ovary remains, there is danger of only partial function.

Within the last eight months I have seen four patients who had previously been operated on elsewhere in whom there has been persistent discomfort, great nervousness, and persistent flushings from the remaining ovary having been left in, and yet not doing sufficient work, so that the patient was relieved from the menopause flushes. If a patient has remaining only one diseased ovary or part of an ovary, there is danger of menopausal symptoms which may persist for as much as a dozen years.

Again, in making a decision concerning how radical we shall be in extirpating the ovaries we must consider the bacteriologic cause of the trouble. If there is a streptococcic or tuberculous infection, we very likely will have bacteria still remaining viable in the tissues, with the result that frequently we will encounter postoperative infection of the ovary with cystic or other serious change. Therefore more radical measures appear indicated in streptococcus or tuberculous infection of the ovaries than in gonorrheal disease of equal severity.

DR. THOMAS J. WATKINS, Chicago. (closing the discussion on his part):—The sex glands have much resistance to infection. The testicle has to be seldom removed for infection although it is often infected. The same is true of the ovary. Abscess of the ovary from contamination from the tube is uncommon; I mean a central abscess of the ovary. These generally result from puerperal infections. The nonpuerperal ovarian abscesses are usually infections of recent corpora lutea. The danger therefore of infections of the ovary left after salpingectomy is the presence of a fresh corpus luteum. We have had to remove ovaries after doing salpingectomy, much less common now than formerly.

I concur in all Dr. Culbertson has said relative to high amputation. There have been too many repeated abdominal sections which are distressing to the patient, disturbing to the surgeon, and discrediting to surgery.

I was interested in Dr. Bell's discussion, as we have been in his other discussions, and I was especially interested in the length of time his patients have continued to menstruate after ovarian grafts. I would suggest that possibly the reason some of them have continued to menstruate for so long a time is because they may have had ovarian tissue left incorporated in adhesions. I have had a number of patients menstruate after I supposed I had removed both ovaries. I had left ovarian structure in adhesions. Authentic cases are on record of patients having borne children after both ovaries and tubes were supposed to have been removed.

DR. FREDERICK C. HOLDEN, New York City (closing the discussion on his part).—The principal reason which stimulated a short experimental study with this type of cases was that I have had to reoperate on so many where there was pain following conservation of ovarian tissue.

At Bellevue Hospital scarcely a week passes without our having to reoperate on patients in whom ovaries have been conserved at previous operations. It was with the idea of having better ovarian circulation and consequently fewer painful ovaries, that I tried this operation in gonorrheal cases.

It may be that I have been fortunate in not having any fatality. The morbidity

has been no greater than when more radical operations are done for similar pathology.

These operations were all performed on women under thirty years of age, with the idea of maintaining menstruation and sexual life, and my hope was that I might be able to symptomatically cure 50 per cent of the cases and greatly relieve 25 per cent with the chance of having to reoperate on the remaining 25 per cent. To my mind the possibility of reoperating on a small proportion of these young women is better practice than any radical operation which totally unsexes them.

We have talked this morning about the value of menstruation, but there has been no mention made of sexual life, and we as gynecologists, I am sure, should not let this function pass unnoticed.

In reference to what Dr. Watkins has said in regard to any women having a number of operations, I might say that we had at Bellevue Hospital recently a girl of 19 who had had her third abdominal operation before coming to Bellevue.

DR. CAREY CULBERTSON, Chicago, (closing).—I agree with Dr. Watkins that the ovary should be conserved whenever possible, and I agree with Dr. Graves that the ovary is the weak link in the endocrine chain, and that its function largely depends upon the way it is stimulated or inhibited by the stronger elements of this system.

Regarding the conservation of the ovary, a point which Dr. Norris brought out, I want to call attention to the fact that the series I have reported consists entirely of cases of pelvic peritonitis. I have not brought into the series cases of fibroids except those wherein fibroids appeared incidental to the inflammatory condition which brought about the attempt to cure. But I take the same attitude toward the ovary in fibroids that I have in this series. I should like to ask Dr. Bell whether he follows the same attitude, that is, of removal and transplantation in treating fibroids as he does in treating pelvic infections.

I wish to ask Dr. Bell one other question. Reference was made to patients menstruating five years after ovarian transplantation was made, and I would like to ask him in how many cases in which he has transplanted ovaries have the women ceased to menstruate.

The examination of the ovary, which Dr. Curtis emphasized in his remarks, is very important. The ovary should be inspected minutely particularly to find small tumors. I have found dermoid cysts not more than half a centimeter in diameter, and I have found pseudomucinous cysts as small as a centimeter in diameter, but if an ovary gives the appearance of simply cystic degeneration, I prefer to leave it undisturbed. The pain which some of these patients have on one side or the other not only before but after operation, I do not attribute always to the ovary. I think that is a great mistake which gynecologists should not make, to attribute right and left-sided pain to the ovary in every case. I believe the majority of these pains are intestinal. Many of these patients have what the internist recognizes as a colitis.

Recently I have been removing the ovary along with the uterus when the patient was in the climacteric, not conserving it as Dr. Watkins has suggested, for the reason that I believe the climacteric is shortened where it is precipitated. It may be more stormy, but I believe it is shortened just as I believe the climacteric is shortened when the patient is treated for it. Placing the patient under treatment either relieves her of the vasomotor and psychic symptoms or modifies them, but in either case the entire course of endocrine reorganization seems to be shortened.

Regarding Dr. Curtis' remarks, none of the 518 cases were operated on in the acute stage. I accepted the verdict of this society many years ago that operation in cases of acute pyosalpinx or acute pelvic peritonitis is bad surgery.

I think Dr. Watkins is right in emphasizing the danger of repeated operations.

I am inclined to be conservative in young women the first time I operate on them, but patients who have come back after one or two operations, should no longer be treated conservatively.

I have not had the experience of Dr. Holden in treating these chronic inflammatory processes by the conservative procedure which he has described, therefore I cannot say more than this: We all know, of course, that where these cases are drained they will often become symptomless for a period of time. A small proportion of my cases were treated prior to laparotomy by vaginal drainage.

I think it is better to evacuate large amounts of pus in the pelvis before opening the abdomen even if the pus is sterile. We know that some of the cases drained vaginally become symptomatically well, so well that they may refuse further operation. Whether it was an actual return to health or simply a comparative relief from the symptoms, I do not know. I think we have all had that experience, and I can see how the operation which Dr. Holden has recommended would be attended by the relief of symptoms at least temporarily, if not for a long time. But I have not followed the procedure he has so ably outlined.

In reply to Dr. Curtis' question relative to patients showing vasomotor or climacteric disturbances after operation, I could only say that the conserved ovary has ceased to function for one reason or another. I do not know why. So far as my follow-up was effective, no such results were observed in the series reported.

Dr. Richard R. Smith and Dr. William J. Butler, of Grand Rapids, read by invitation, a paper entitled **Concerning Torsion of the Uterine Adnexa Occurring before Puberty, Together with a Consideration of Torsion of Normal Uterine Adnexa.** (For original article see page 507.)

DISCUSSION

DR. BROOKE M. ANSPACH, Philadelphia.—I have seen one case in a child of 12 with symptoms of acute appendicitis, who had menstruated once, in which the diagnosis was plain because she had a large doughy tumor occupying the culdesac of Douglas.

Whether a normal appendage may undergo torsion I think there is reasonable doubt, but as Dr. Smith has stated, the ovary may have an abnormal attachment to the broad ligament and then it may undergo torsion just as an ovarian cyst may undergo torsion. The tube may be much elongated and very much thickened at its outer extremity so that it presents a pear-shaped tumor, and that may undergo torsion. When these structures have undergone torsion, there are certain structural changes which are the result of hemorrhagic infarction, and it is difficult to say what the adnexa were like before torsion occurred. A number of years ago I collected a series of cases of torsion of enlarged tubes. Some of them were mistaken clinically for acute appendicitis. There was no previous history of pelvic trouble, and then the question arose as to what had been the original state of the tube, and it seems that a majority had been hydrosalpinges which by twisting had become hematosalpinges. In the explanation of certain cases of sterility in women, who have no previous history of pelvic trouble, it would be interesting if we had positive information as to how much influence the exanthemata and appendicitis occurring in childhood, and certain diseases in adult life, have upon the tubes, and how frequently they produce adhesions which close the outer ostium leading to sterility and hydrosalpinx. Since the severe epidemic of influenza in Philadelphia two years ago, many patients as you take their histories, declare that they were entirely well until they were stricken with influenza. The work of Rosenow and Davis who found

metastatic infection of the ovary in cases of streptococcus sore throat is suggestive to say the least.

DR. HUGO EHRENFEST, ST. LOUIS, Mo.—The case reported by Dr. Smith was operated on the suspicion that it was appendicitis. I am under the impression that the literature emphasizes this mistaken diagnosis as an important clinical fact. Most of these twists and torsions occur on the right side.

DR. SMITH.—Three to one.

DR. EHRENFEST.—This explains why in most of these cases the preoperative diagnosis is appendicitis.

DR. HIRAM N. VINEBERG, NEW YORK CITY.—Some fifteen years ago I was called by a physician to see a girl, 11 years of age, in whom the diagnosis of acute appendicitis had been made. The abdomen was enormously distended, and the doctor drew attention to that, and thought it was simply a flatulent distention. It was quite evident the child had a large ovarian tumor with twisted pedicle. The diagnosis was simple. In fact, the child was taken suddenly with severe pain which would account for the symptoms caused by a twist of the pedicle. I operated on this girl, and she made a smooth recovery. Since then she has married and has borne children.

I would like to ask Dr. Keene if he can give us an explanation of the fact that in most of these cases that have a twist of the pedicle there are bladder symptoms. It is almost a pathognomonic symptom. In addition to pain, there is frequency of urination. I have never been able to explain this symptom satisfactorily. Of course, in many of the cases, especially in dermoids, the tumor lies in front of the uterus, but there are, as a rule, no urinary symptoms until a twist of the pedicle occurs.

DR. FLOYD E. KEENE, PHILADELPHIA, PA.—The case that I reported was a twisted dermoid cyst lying in close proximity to the bladder. Bladder irritability is more common in dermoids than in the ordinary type of ovarian cyst.

The case I referred to in my paper was a twisted and infected dermoid cyst lying in close proximity to the bladder. Vesical irritability is more common with dermoids than with the other types of ovarian cysts due largely, I think, to the fact that they often lie anteriorly, thus impinging directly on the bladder wall and further, the well-known clinical fact that dermoids are prone to produce irritation in adjacent structures.

DR. CHARLES C. NORRIS, PHILADELPHIA.—I should like to place on record two cases of torsion in apparently normal ovaries. In one case the clinical history is incomplete. The enlarged ovary was about the size of an English walnut. The tube was edematous, the ovary was so densely infiltrated with blood that I could not determine much about it, even by histologic examination. There was neither macroscopic nor microscopic evidence of new growth in this ovary.

The other case, one of my own, showed a similar specimen, occurring in an adult, the left ovary being the one involved. There was no previous history of inflammation, except that an abortion had occurred some years before with some infection. There had been a period of apparently perfect health. The symptoms developed rapidly, and on seeing the patient, I inclined to the belief that she had a small ovarian neoplasm that had undergone torsion. The abdomen was rigid, and the adnexa could not be made out with any degree of certainty. On operation I found an edematous tube; the tube was not, however, twisted, but the ovary was twisted on its pedicle and densely infiltrated with blood. Histologic section showed nothing beyond a mass of blood and there was no evidence of a new growth.

Those cases bring up the question of the etiology of torsion. We all know that

there are certain factors that bear a definite relationship to the torsion of ovarian neoplasms, namely, the size of the tumor, the irregularity of its shape, the length of the pedicle, the amount of intraabdominal pressure, the action of the diaphragm, the peristaltic action, etc. None of these factors, however, has a definite bearing on this type of lesion occurring in so-called normal ovaries. I doubt whether a normal ovary ever undergoes torsion, except when in a hernial sac, or when it is attached to some other structure. One well-known English gynecologist (I believe it was Dr. Bell) some years ago advanced a most interesting theory as to the cause of torsion and which, perhaps, may have some bearing on this type of case. The ovarian circulation is extremely tortuous, corkscrew-like, as it were. The theory as advanced applied to neoplasms and not to so-called normal ovaries. If we can conceive of anything that will cause a partial blockage of the return circulation, the vein, having a thinner coat than the artery, would be the first to become compressed. This would cause congestion, the pumping of the blood into the adnexa by the patent artery would have a tendency to straighten out the tortuous blood vessels, and in so doing would twist the ovary.

Curiously enough, my case somewhat bears out this theory, since on the posterior surface of the broad ligament, corresponding to a point about where the ovarian vessels entered, there was a scar that appeared to me to be the result of a lesion that developed at the time of the abortion years ago, and it is conceivable in this case that the scar may have contracted and thus blocked off the return circulation from the ovary, the constant twisting of the ovary producing the lesion I have just described.

THE NEW YORK OBSTETRICAL SOCIETY. MEETING OF MAY 10, 1921

THE PRESIDENT, DR. FRANK R. OASTLER, IN THE CHAIR

DR. J. VAN DOREN YOUNG presented a Report of the **Result Following Radium Treatment of Fibroids**, in which was shown a truly remarkable symptomatic, and actual improvement after one application of radium, and also called attention to the parametrial changes that rendered the subsequent operation more difficult and the hemorrhage at the time of operation more severe.

Mrs. W., forty, multipara, 2 children, oldest eight, youngest four and one-half years. Family and personal history negative. Menstruated every fourteen to twenty-eight days, duration seven to ten days, extremely profuse with many and large clots. Patient stout, weight 143 pounds, very pale, heart and lungs negative. Examination showed lacerated perineum with rectocele, cervix lacerated and badly infected, uterus normal position and motility, an intramural fibroid estimated to be 9 cm. in diameter occupies the fundus. Adnexæ negative. Urine negative. Blood examination: Hemoglobin 52 per cent; red blood cells 4,040,000; leucocytes 12,300. Differential: Polys. 81.2; trans. 2; lymph. 16.2; large mono. .4; eosinophiles .2. Microcytes, megalocytes present. Decided changes in size and variations in shape. Findings suggestive of the pernicious type of anemia. November 5, 1920, patient entered the Nursery and Child's Hospital for observation and local and general care. The period observed in the hospital was as profuse as a severe postpartum hemorrhage. November 22. Radium application by Doctor C. Everett Field, intrauterine, 114.5 milligrams radium element,

screen 1 m.m. silver and gold alloy, period 8 hours. No reaction. November 24, the blood picture improved, hemoglobin 72, red blood cells 4,900,000, leucocytes 8100, differential normal. This in part due to improvement in the focal infection of the cervix. The next period was profuse, the second scanty, none afterwards. February 1, 1921. Blood picture, hemoglobin 85, red blood cells 5,180,000, leucocytes 8600 differential normal, cell changes much less marked.

February 12, 1921. The patient having greatly improved and become a safe operative risk, it was decided to remove the uterus. This decision was reached, after due consideration of the changes in the blood picture, and the lessening of the size of the tumor, and taking all the facts in the case, the possibility of fundal carcinoma, the history, her long semi-invalidism, the blood cell changes and the question of the permanency of the stopping of the bleeding.

Panhysterectomy was performed by the method of Polak, both ovaries and tubes were left in place. Difficulty was encountered by the rigidity of the lower parametrial connective tissue and the excessive hemorrhage therefrom. The patient made an uneventful recovery. The pathologic examination made by Doctor Higgins, showed no malignancy, small fibromatous nodules in the wall, also one fundal intramural fibroid 2 cm. in diameter.

The points in this case are, the change in the blood picture from one suggestive, at least, of pernicious anemia to a rapidly disappearing simple type. The marked reduction in the size of the tumor from 9 to 2 cm. in diameter. The prompt control of the bleeding by the radium application, thereby making the patient a safe operative risk. The rigidity of the lower parametrium. The restoration to health from invalidism, by the combination of radium and surgery, the radium making the surgery possible and the surgery making the radium results permanent. Dr. Young stated in his opinion there are two grave objections to a diagnostic curettage, first there is absolutely no assurance that the curette will find the malignancy, especially is this true in fundal fibroids, second the trauma of the curette is a real danger in freeing malignant cells. A negative result may only give a false sense of security, a positive increases the danger to the patient. It seemed a more logical procedure to trust to the locking up, by the radium, of any possible malignancy in the uterine body, and the removal of the uterus alone, rather than use the curette with its uncertainties and dangers, on this theory the ovaries and tubes could be safely retained, even in the presence of fundal malignancy.

DR. YOUNG also reported a case of **Aberrant Fibroid, Marked by an Unusual Location of the Tumor.**

Mrs. D., age 40 years. Nullipara. Family and personal history negative. Menstrual history normal. In 1910 was operated upon and a myomectomy done, in the hopes of curing a sterility. Patient complained of pelvic distress and irritability of bladder, worse at times, with occasional severe pain referred to right lower quadrant of abdomen, resembling ureteral block. Examination showed a large mass of fibroids filling the pelvis. A separate mass was felt on the right, apparently in close contact with and pressing upon the bladder.

Operation, New York Nursery and Child's Hospital, January 12, 1921. Upon opening the abdomen a mass entirely separate from the uterus and the uterine fibroids was found, imbedded in the bladder wall and in appearance closely resembling a malignant growth of the bladder. After careful inspection a point of cleavage was found, and the tumor shelled out, the bladder wall was wrapped about it, covering most of the tumor. The peritoneum of the bladder covering the tumor

was destroyed and in the center of this denuded area an artery of some size was found and ligated. This was evidently the source of nourishment of the growth. The bladder wall was carefully repaired. Supracervical hysteromyomectomy was done, leaving both tubes and ovaries. The recovery was uneventful. Microscopic examination showed all the tumors to be hard fibromata, no malignancy found.

The location of this aberrant fibroid was unique, the wrapping of the bladder wall about the tumor, most unusual, and the development of a sufficient blood supply from the bladder wall to keep up the nourishment of the growth, is difficult of comprehension.

DISCUSSION

DR. JOHN O. POLAK:—I would like to ask Dr. Young whether the uterus was curetted prior to the radium application. It seems to me that that is necessary in cases of bleeding where there is a question of fibrosis or intrauterine polyp or carcinoma of the fundus. That would possibly have saved the woman this operation. The interesting thing is to see how the radium does actually contract these fibroids, and I believe that there are a very large number of these cases that are absolutely cured by the radium and need no surgery whatsoever. If the doctor had waited a few months longer the uterus would have been so atrophied that he wouldn't have found it necessary to remove it, and if he had waited a little while longer and had removed the uterus, he wouldn't have found this difficulty with the parametrial tissues that he did.

DR. H. D. FURNISS.—I recently saw a patient on whom a different form of radiation had been done, namely, x-ray for fibroid. She had been treated for a long period and afterwards came to me for return of the bleeding; the growth had not diminished much in size and she was suffering a tremendous amount of pain. On opening the abdomen I found the omentum plastered densely to the top of the uterus and an absence of fat in the omentum, a condition often found after x-ray radiation. It follows so frequently after x-ray radiation that in some of the foreign clinics they x-ray them from the back with the patients in the knee-chest position and from in front in the Trendelenburg, so as to have the intestines and omentum fall out the way of the rays. In this particular case the bladder was intimately adherent to the uterus and made the operation more difficult.

Another use, I think, for radium is in case of cystocele where there is a rather large uterus that is going to be a little too large for an interposition operation, and that can be very nicely shrunken down so as to make a wedge, within a month or two after the application of the radium.

DR. HERMANN GRAD.—I would like to ask Dr. Young if he does not feel that perhaps there was a little pedicle attached to this uterine fibroid to the cervix. Perhaps it was one of those cervical fibroids that had grown towards the bladder and the bladder covered it.

I would also like to ask Dr. Young, if he thought the second case was malignant, why did he leave the tubes and ovaries? Why not a total extirpation for malignancy?

DR. HAROLD BAILEY.—I do not quite see the justification in Dr. Young's case for the hysterectomy. However, I have had occasion to receive a little criticism and also to criticize myself for a somewhat similar procedure. In the case I wish to speak of the woman continued to bleed, and for that reason I felt that the probabilities were that she had some malignant growth within the uterus, although she had been curetted at the time of the first application of radium. I removed the uterus. The fibroid had vanished. It was a small and very thick

walled uterus, and, strange to say, although treated with just the ordinary dose of radium on histologic examination there was no mucous membrane in the uterus, showing how radium can really do considerable damage.

DR. W. P. HEALY.—I would like to refer to the difficulty experienced in the removal of the uterus in the case previously treated with radium. The experiences that we have had at Roosevelt Hospital after the use of radium have been very different. For instance, I do not believe you can say necessarily at the end of six weeks or eight weeks that it will or will not be difficult to do the hysterectomy. I think it is an equation that deals with the individual case. I have done it six weeks after very heavy doses of radium for cancer of the cervix and did not have any difficulty whatsoever—not any more than one would experience in any hysterectomy that had not been radiated. As this operation of Dr. Young's was done so long after the radium was used I would hesitate to say that the radium was the source of his difficulty. Of course, the question of having done the operation at all is, I think, somewhat open to criticism. We certainly would not think of radiating a case without curetting it and having a very careful examination of the material obtained microscopically so as to protect the patient from any oversight in following up the radium with other treatment if necessary.

The use of radium in intrauterine application in these small fibroid uteri has become thoroughly accepted as a method of treatment and the experience of those of us who have had radium to use on a large number of cases has been, I think, that the majority of cases do well. They may have one period or two periods after the use of a dose of radium—I am going to say 600 to 1200 milligram hours, so that you may have some idea of what I am referring to in the way of dosage, screening with the silver and brass capsule and the thin black rubber tube. After such treatment, 600 milligram hours, the patients may have a menstrual period the next time, but up to the present my experience with them has been that subsequently they do not tend to bleed, and such was the case until I had a report this week from a patient that I treated last August, a bleeding uterus, not a fibroid, and she did not menstruate from the time of the treatment until about ten days or two weeks ago when she had a perfectly normal menstrual flow.

I would like to ask Dr. Bailey with regard to his closing statement in his case that he described to us; that is, the disappearance of the mucous membrane of the uterus after an ordinary dose of radium. I would like to ask him, just what an ordinary dose of radium is in his opinion.

DR. JOHN O. POLAK.—I would like to ask Dr. Healy a question. If he uses 600 milligram hours, does he intend to produce an amenorrhea, or does he intend to reduce the amount of the menstrual period and continue the menstruation? I rather thought that that amount would promote a continuance of the menstruation in moderate quantities.

DR. HAROLD BAILEY.—I think that what Dr. Polak says is applicable. Six hundred milligram hours, in my opinion, is the dose suitable for myopathic hemorrhage cases in which you expect and hope that menstruation will return after nine months or a year, but for the fibroid cases my dose is exactly double that. Twelve hundred milligram hours is the routine dose for fibroids. That stops the bleeding in what I should think, roughly stating it, to be 90 per cent of cases, and 1200 milligram hours I consider the ordinary fibroid dose.

I think one must be a little bit careful about the diagnosis in these cases of hemorrhage where the bleeding returns. The mere fact that the case has been curetted at the time of the first treatment does not free you entirely, because we have had cases where the curettings were negative and the bleeding returned, and then the report from a second specimen came back adenocarcinoma. So I

feel that one should be cautious about accepting the one curetting as proof positive that the case is or is not cancer.

DR. W. P. HEALY.—Dr. Bailey has answered the question completely. I agree absolutely with what he has said. If we have a fibroid in which we want to eliminate the tumor, where we are not considering the menstrual period at all, we use 1200 milligram hours. Where we have just a bleeding uterus and want to cut down the hemorrhage and are not particular as to whether the period returns or not, we use 1200 milligram hours. Where we have a woman who is only bleeding and who wishes to retain her periods, I won't even use 600 milligram hours, but will give her less. I think if you give 600 milligram hours to a woman who wants to retain her menstrual periods, you are taking a very great risk because you may destroy the mucous membrane entirely.

DR. YOUNG. (Closing).—I had hoped to learn of other cases where fibroids had left their uterine attachment and become fixed to the fundal wall of the bladder. I am loathe to believe that this condition is so rare as not to have been observed by any one present.

In answer to Doctor Polak's question I would say that I did not curette prior to the hysterectomy in the second case for I admit a good deal of skepticism as to the value of curettage, under the circumstances, namely a fundal fibroid 9 cm. in diameter encroaching on the uterine cavity and greatly distorting the wall, thus making it difficult to obtain scrapings that would prove the presence of malignancy. If radium was of any value it would surely lock up a malignant area in the fundus and render its removal safe and complete.

Dr. Polak's statement in relation to a longer wait to determine the full amount of benefit to be derived from the radium is important, the radium in this case was applied for the purpose of making the operation possible, which it did.

The patient's history, her long-continued profuse hemorrhages, the blood changes and the uncertainty of a permanent stoppage of the hemorrhage, justified in my opinion the operation, to render permanent the relief obtained and save the patient, and surely her present condition seems to justify this opinion. Her bleeding was severe enough to endanger life and she was fast becoming an invalid. Surely it was good judgment to make a recurrence of this hemorrhage impossible, rather than simply hope it would be.

The shrinkage of the fibroid was most instructive and in a less desperate case would influence my judgment as to waiting.

In answer to Dr. Grad's question as to the possibility of the aberrant fibroid having a pedicle attached to the cervix, I would say that it was absolutely free and implanted on the fundus of the bladder wall forward and to the right.

Dr. Grad's second question as to why I did not remove the tubes and ovaries, surely radium would lock up any possible malignant cells in the fundus and a removal of the uterus would be sufficient.

DR. FRANKLIN A. DORMAN presented a **Report of Case of Placenta Previa Showing the Result of Blood Transfusion.**

Mrs. G. white, twenty-eight years, para-iv. Normal living births, 1916-17-19. Referred to Woman's Hospital by physician as emergency case. Admitted 12:10 A.M., April 27, with history of painless bleeding (vaginal) 7 P.M. same evening. Amount estimated by patient more than one pint. On admission pulse 116;

blood pressure 130/90; general condition, fair. Examination showed cervix dilated 2 fingers plus, membranes intact and complete placenta previa. Patient immediately prepared and No. 4 Voorhees bag inserted; bag expelled at 6:25 A.M. with moderate hemorrhage. Patient taken to delivery room and cervix found almost fully dilated, membranes not ruptured, internal podalic version, breech extraction. Baby weighed 7 lbs. 12 ozs., all efforts of resuscitation failed. Placenta almost immediately followed birth of baby. Uterus, cervix and vagina firmly packed with 21 yards of 2″ gauze. Pituitrin and ergot hypodermatically, hypodermoclysis 500 c. c. saline, condition unimproved; 300 c. c. of gum glucose given intravenously. Patient returned to bed in poor condition, Murphy drip started. Hemorrhage during 1st, 2nd and 3rd stages estimated at 40 oz.; 4 P.M. same day blood transfusion from husband 400 c. c.

BLOOD COUNTS

DATE	RED CELLS	HGB	WHITE CELLS	POLYS	LYMPHOCYTES	
4/27/21	3,200,000	54%				Before transfusion
4/28/21	2,336,000	52%	21,400	83	17	24 hrs. after "
5/1/21	1,744,000		16,050	84	16	
5/3/21	1,648,000	42%	13,100	68	32	
5/4/21	2,456,000	44%	14,850			
5/6/21	2,608,000	52%	8,900	69%	31	

4/27/21. Patient's blood type, Group 3. Husband's blood type, Group 4. (Universal donor)

5/2/21, 2:30 P.M. second transfusion started, 100 c.c. given, transfusion stopped, patient collapsed, pulse poor quality, chill, marked rise in temperature to 106° F. Until May 6 condition remained precarious, high pulse, high temperature. Since then steady improvement. Since May 5, marked odor to lochia. Examination of lungs showed no dullness, no change in voice, few fine râles at bases, posterior.

5/6/21. Brother's blood typed, Group 4, but corpuscles are agglutinated slightly by patient's blood, Group 1.

DISCUSSION

DR. HERMAN GRAD.—I would like to add another case of placenta previa with blood transfusion. This was a few days before Dr. Dorman's case occurred at the hospital. I delivered a woman of a 6½ months' baby. She had placenta previa with a moderate amount of hemorrhage after the placenta was delivered and I packed the vagina and the lower segment of the uterus, but not very tightly. The blood pressure was down to 60; the diastolic could not be made out. We gave her 300 c.c. of a solution of 6 per cent of gum and 20 per cent of glucose and her blood pressure came up to 110 with the diastolic somewhere about 50. This held her for about two hours when she had a second hemorrhage. She vomited and expelled a good deal of the packing, and with that came a very profuse hemorrhage and at once her blood pressure dropped to 60 again. We then felt (it was the middle of the night) that she should have some blood. She was typed and it was found that she was a No. 3 and her husband was a No. 2, so we had to go outside to get a donor. Fortunately, we were able to get a donor in an hour and transfused her with 500 c.c. of blood. There was a very remarkable change in her condition at once. She came out of her coma, but within an hour she had a very severe chill. She reacted and for two days she had a subnormal temperature. Then she began to have a rise of temperature up to 104° for about three days when I began to use phenol iodine, giving her a dozen of those injections. Whether that helped or not I do not know, but it seemed

to me it did. She made a very nice recovery. When we started transfusion, she had 45 per cent hemoglobin and after transfusing her with 500 c.c. it was only raised 10 points but the red cells were raised over a million. The change in her condition was very perceptible, and it was really a life-saving measure in this patient.

DR. G. H. RYDER.—I would like to ask Dr. Dorman if, after putting in the bag, he took any precaution to ascertain exactly when it came through the cervix, because if he put the bag in a cervix in which there was two fingers' dilatation it seems to me it is important to find out when the bag comes through the cervix, and, further, because as soon as the bag comes through the cervix and into the vagina hemorrhage can occur and will continue until the bag is removed and the baby delivered, which should be done at once. That might account for some of the hemorrhage after the bag was inserted.

DR. G. W. KOSMAK.—The case reported by Dr. Dorman was of a great deal of interest to me because I have had the opportunity to employ transfusion in several cases of placenta previa at the Lying-In Hospital. I became impressed with the fact that one should exercise a great deal of caution in infusing these patients with blood, for possibly the sudden introduction of so much fluid in the patient's circulatory system may set free thrombi that are in the process of formation and bring about these chills that we so often see after transfusion. Of course, it is possible that the chills are due merely to admixture of the blood, but in cases of placenta previa, where the muscular apparatus of the uterus is not able to close up the sinuses as readily as where the placenta is normally situated, I think the process of thrombus formation is not the same as in the other class of cases, and that emboli are more readily set free when this sudden accession of fluid in the vessels takes place. For that reason in the last case which I observed we delayed the transfusion for forty-eight hours until the woman had recovered from her primary shock, and I think we got a very much better clinical picture as a result. This has taught me a lesson that I shall follow in the future, namely, in all these cases of placenta previa where we feel that the patient needs the stimulus afforded by transfusion to wait until the primary shock is over, until the circulatory apparatus has had a chance to adjust itself, and until the thrombi in the placental site are fully organized.

DR. FRANKLIN A. DORMAN.—We all recognize the fact that placenta previa is a peculiarly valuable field for blood transfusion. In regard to Dr. Ryder's question: I believe that a woman with an extra- or intraovular bag in placenta previa should be watched constantly, and personally I keep such a patient on the operating table. I believe Dr. Kosmak's point is a good one, namely, that in most of these cases we can carry them along with fluid to get over the initial shock, and then give them the upbuilding force of blood. I think we probably overdo the amount of blood that we give. It seems to me in this case this patient really got more benefit from the small, or second, dose of blood (100 c.c.), in spite of her reaction than from the first injection of 400 c.c., which was twelve or eighteen hours after her labor.

DR. SOLOMON WIENER presented a. **Report of the Unusual Life History of a Uterus Didelphys.**

Mrs. C. L. T. first consulted me in October, 1914. At that time she was twenty-two years old and had been married several months; she was bleeding freely after a period of amenorrhea of two months. There had also been a constant dyspareunia. Examination showed a normal vulva; there was a complete vertical

vaginal septum forming a double vagina. At the upper end of each vagina was a distinct and separate cervix with a normal external os, the right one being open, and from it the hemorrhage was coming. There were two distinct and separate uteri, the right one being of the size and consistency of a six weeks' pregnancy, and the left about normal in size. The diagnosis was incomplete abortion with a uterus didelphys and double vagina.

Under anesthesia these findings were even more plainly evident. A curettage for incomplete abortion was performed. The remains of the ovum were in the right uterus. The left uterus was also curetted, and it is of interest to note that it contained a fully developed decidua, although otherwise empty. Sounds were passed simultaneously into both uteri; these showed the uterine cavities to diverge markedly. At no point did the two cavities approach each other, much less was there any communication between the two.

Because of the dyspareunia the vaginal septum was resected, converting the vagina into one normal-sized cavity.

Four months later the patient consulted me again, she being pregnant a second time in the right uterus. This could be felt to be distinctly enlarged, the left uterus remaining approximately normal in size. For the first four months of this pregnancy the left uterus could be distinctly palpated to one side, giving somewhat the same impression as that of a pedunculated fibroid on the surface of a gravid uterus. As the pregnancy advanced the gravid uterus began to overshadow the empty small uterus in the palpatory findings, and in the last months the latter could not be felt at all. This refers, of course, to the fundus; both cervices were naturally at all times distinctly palpable and visible in the speculum.

In view of all I had read and heard about the possibility of dystocia in double uteri, I viewed the approaching labor with some trepidation. However, on October 14, 1915, the patient gave birth to a six pound healthy baby after a normal labor of eight hours. There was no postpartum hemorrhage. At the end of the puerperium the right uterus which had carried the fetus, was well involuted and but little larger than its mate. The right cervix, however, showed a slight bilateral laceration, while the left cervix was virginal.

Five years after the birth of this child the patient again became pregnant. I took it for granted that this pregnancy was also in the right uterus. Great was my surprise upon examination to find the left uterus this time the size and consistency of a three months' gravid organ, the right uterus being distinctly palpable as of normal size. In this third pregnancy conditions were exactly the reverse of the preceding one. The right uterus could be felt for four months to the side of its gravid mate, it now giving an impression not unlike that of a pedunculated fibroid. On January 30, 1921, after a normal labor of twelve hours, the patient gave birth to a six and one-half pound baby. This child was also normal except for a talipes equino-varus of the right foot.

At the end of this puerperium the two uteri were about equal in size; the only change was that now both cervices showed a slight bilateral laceration.

Double uteri are not so uncommon. Usually, however, one is rudimentary and the functions of procreation are carried on by the fully developed organ. The fact that this patient has two uteri both of which have carried a fetus to full term, ending in normal labors, is rather unique. Evidently dystocia and hemorrhage postpartum are rather to be feared in septate uteri, or in bicornate uteri in which one horn is rudimentary. Where there is a true uterus didelphys and the two cavities and organs are separate and distinct, normal pregnancy and labor may be expected.

DR. P. H. WILLIAMS.—A number of years ago at the Vanderbilt Clinic, a

woman came in complaining of a vaginal discharge, and on examination I felt a lacerated cervix, somewhat inflamed, and what I thought was a pedunculated fibroid. On more careful examination I found a septum in the vagina and a fair-sized, normal cervix. The left uterus was the one she had the pregnancy in before and while she was still under my care she became pregnant on the right side.

The peculiar thing about that case in contradistinction to the one reported here tonight was the fact that she was delivered of a full term child from the left uterus. Evidently, the doctor who delivered her never discovered that she had a double uterus and a double vagina, because the septum of the vagina lay more closely to the right side. The right vagina, as I remember, was much smaller than the left. Why she became pregnant in the left side the second time I do not know.

DR. JOHN O. POLAK.—We had a case about four years ago of a woman who had a uterus didelphys and a twin pregnancy on one side and was delivered. The side from which her babies came went through proper involution, but for a very long period until she was curetted in the other uterus she continued to have a metrorrhagia. Now, Dr. Wiener has cleared that up very nicely, and it is a point that we want to think of; namely, that decidua forms in both uteri in these cases. She subsequently became pregnant, just as Dr. Wiener's case did, and she became pregnant in the other side of her uterus didelphys and was delivered of a normal baby.

Two days ago at the College Hospital another case was delivered that had given us a great deal of trouble. Fourteen months ago she came into the hospital with a dead baby and dystocia. A diagnosis was made of an incarcerated fibroid in the pelvis at the time, and as the baby was dead, we delivered it by morcellation through the vagina, and about three weeks later I opened the abdomen to remove this fibroid, and found it consisted of a uterus didelphys. It was not well developed, being more of a rudimentary type, so I did the procedure similar to that suggested and removed half of her uterus, closed the side of the uterus from which the connection came, and she was delivered a few days ago of a full term child, alive, out of the other half of her uterus.

DR. ELIOT BISHOP.—I would add another case to those which have been reported, found in a woman whom I thoroughly curetted for incomplete abortion. She continued to bleed slightly, very dark in color, but as she seemed perfectly well, she went home. The flow persisted and then she had another curettement when the uterus was found to be one of the didelphys type.

DR. W. M. FORD.—I would like to ask Dr. Wiener why he asserts with such comparative assurance that the uterus didelphys had nothing to do with the club-foot. I believe that any deformity of the uterus which predisposes to abnormal positions of the child *in utero*, such as a malposition or a deficient amount of fluid in an otherwise normal pregnancy with an unusual position of the child, might predispose to a club-foot. It seems to me that in a uterus didelphys the possibility of some fetal deformity from cramping of the child *in utero* might be expected. We know these club-feet are very rarely paralytic and are usually the result of malposition.

DR. SOLOMON WIENER.—I cannot give a very satisfactory answer to Dr. Ford's question, but I do not believe that there can be any direct connection unless it be the fact that the mother has a tendency to congenital anomaly which might be hereditary, but the club-foot, as I understand it, is not due to any possible pressure from without, it is not caused by the position of the child in the uterus but is due to shortening of the tendons on one side of the foot.

Dr. William E. Caldwell presented a **Report of a Fatal Case of Epilepsy and Two Cases of Chorea in Pregnancy.**

At Sloane Hospital, in the last 20 months, there were four cases of chorea in its more severe form, of which two were reported in detail. To these he added the history of a fatal case of epilepsy.

CASE 1.—Mrs. D. T., twenty-two years of age; admitted to Sloane Hospital, Jan. 29, 1920.

Family history negative. Patient was healthy, normal child until the age of two and a half years, when she had pneumonia and during convalescence contracted measles. This was followed by rheumatic fever, though her doctor called it infantile paralysis. At six years of age she had whooping cough; at 8 she had scarlet fever; at 9 she had diphtheria; at 11 she developed chorea, which lasted for three months, complicated by rheumatism and endocarditis. Was treated by Dr. L. Emmet Holt. She made a good recovery from this and is described as being very healthy and normal, indulging in strenuous exercise such as hocky, tennis and running, while at boarding school, with no bad results. At 17 years of age she had mumps; at 18 she had German measles.

Menses began at twelve years, 33-day type; duration 8 days; flow profuse; always excessively painful and usually accompanied by vomiting and marked prostration, for which she was frequently given morphine. In her eighteenth year she had a dilatation and curettage for this dysmenorrhea with no subsequent improvement.

She was married January 7, 1918, at twenty years of age. A male child weighing nine and a half pounds, was born on Oct. 12, 1918, after a perfectly normal pregnancy and an 8-hour labor. This child at the present time is more than 2½ years old, is perfectly well, and has had no serious illness. During the greater part of this first pregnancy her husband was in France, which caused her considerable anxiety; but there were no symptoms of chorea.

During the fourth month of her second pregnancy, in November, 1919, she developed a skin rash which was diagnosed as pityriasis rosea. There was no tonsillitis or rheumatic pain. During the same month she complained of difficulty in swallowing and of constantly biting her tongue while talking or chewing. Her disposition became irascible and quarrelsome. Soon she began to twitch in the left arm and left foot.

During Christmas week, 1919, she became physically disturbed and emotionally unbalanced. She was admitted to Sloane Hospital; a diagnosis of chorea was made. The treatment consisted of rest, hot packs, bromides and chloral, glucose solution by rectum, and colon irrigations. Her temperature and blood pressure were normal and urine negative. She did not improve and was very unhappy in the hospital. She was taken home with nurses and kept absolutely quiet, the same general treatment being maintained. After consultation, emptying of the uterus was advised. There was some delay in obtaining the family's consent for this procedure. Meantime the patient became very much worse, since it was impossible to nourish her properly or to give her rest. The spasms became almost constant, involving the entire body. The heart became dilated and developed a loud systolic murmur at the apex. Her anemia rapidly increased, showing a hemoglobin of 50 per cent. She developed a temperature of from 100° to 100.8°.

She was readmitted to Sloane Hospital, Jan. 29, 1920, and labor was immediately induced with a No. 3 Voorhees bag, under chloroform anesthesia. Twelve hours later she was delivered by an easy breech extraction, of a six months' female child which lived for six hours. During her twelve hours in labor she

had three doses of hyoscine hydrobromide of 1/200 of a grain, and one initial dose of ¼ grain of morphine. She was quieter during these twelve hours than she had been for several weeks. Immediately after delivery the spasms almost ceased. Some twitchings of the fingers and of the corners of the mouth continued for several weeks. Prostration was marked and convalescence slow. She ran a low grade temperature during the first two weeks' postpartum. A "late systolic" murmur at the apex of the heart persisted with a pulse rate that ranged from 42 to 60. The tonsils were very much enlarged and ragged. Culture showed streptococcus viridans as the predominating organism.

Treatment and medication during the postpartum period consisted of hot packs, forced feedings, arsenic and iron, salicylates and luminol.

She was discharged about March 10, 1920. In May, 1920, she had a severe follicular tonsillitis but no rheumatism and no chorea or heart involvement. Her pulse rate has slowly come up to 80 and her heart is functionally all right. Systolic murmur at the apex persists. She is exceedingly active and never shows cardiac embarrassment.

Laboratory Findings.—Two blood cultures: sterile. Blood chemistry: normal values. Urine: negative throughout. Throat culture: streptococcus viridans predominating. No leucocytosis but rather marked anemia.

CASE 2.—Patient, P.S., age nineteen. Roumanian. Married. Admitted to Sloane Hospital March 29, 1921, in twenty-seventh week of first pregnancy.

Father died at 28 years of age: "kidney trouble." Mother alive and well. Two older sisters and one older brother alive and well. No history of rheumatism or chorea in the family.

Never a strong child. Tonsils removed at eight years of age. Continued to have occasional sore throat, with "growing pains." No history of scarlet fever or acute rheumatic fever could be obtained. Did fairly well at school. Popular with schoolmates and had many friends. When sixteen years of age she developed chorea and was treated at Mt. Sinai Hospital for three months. She had no further trouble until she was married, August, 1920.

Menstruation began at thirteen years; 28-day type; duration 3 to 4 days; amount scant; pain slight; last period August 23, 1920.

The patient became pregnant during August, 1920; was perfectly well and happy until October, when she became extremely irritable and unhappy. In November, 1920, she developed a frequent twitching of the left hand and face. This twitching had increased and extended until the entire body was affected. For a few days before entering the hospital the motion had been almost constant and the patient was having difficulty in swallowing.

The patient's temperature on admission was normal, but rose to 100° within a few hours. The blood pressure was normal; the pulse was regular but very fast. She could not swallow and, though she was conscious, could not speak on account of spasms of the throat muscles. The patient was slightly built and undernourished. Purposeless movements of the entire body and extremities were present with short intervals of quiet. The motion was generalized choreiform, affecting all the muscles, and tended to the assumption of extreme attitudes with forcible contractions. Reflexes greatly exaggerated. No pathologic reflexes found. Sensation retained to tuning-fork, of body and head. Cranial nerves all normal. Moderate ptosis of right eye lid. Slight exophthalmos. Pupils equal and reacted to light and accommodation. Eye-grounds negative. Tongue sore: had been bitten. Tonsils markedly hypertrophied. Glands of neck enlarged. Neck not stiff. Heart five and a half inches to the left of the midline in the sixth space. Distinct thrill of apex; very localized. Marked precardial thrust. Long blowing systolic

murmur at the apex. Rate 156. Abdomen showed a pregnant uterus of about 28 weeks. Pelvic measurements normal. Fetal heart 162; heard best left and below. Cervix one and a half fingers dilated.

Laboratory Findings. Two blood cultures: negative. Blood count: hemoglobin, 60 per cent. Red blood cells, 3,240,000. White blood cells, 11,600. Polynuclears, 71 per cent. Urine shows some pus and the culture bacillus coli. Blood chemistry: N. P. N., 31.7; urea N., 13.8; creatinine, 1.2; uric acid, 1.9; sugar 0.09; Wassermann reaction, negative. Phthalein reaction, normal. Throat culture shows: right tonsil, abundant streptococcus, few hemolytic; abundant gram negative diplococcus; probably diplococcus mucosus; left tonsil, abundant hemolytic streptococcus; abundant diplococcus mucosus.

Attempts to control the patient with morphine and hyocine, hypodermically, and chloral and bromide by rectum, and the use of hot packs, was only partially satisfactory.

A question which has already arisen in one of these cases, and which must constantly occur, is the advisability of permitting subsequent pregnancies. If the tonsils are removed, and all focal infections eliminated, and the heart is not too seriously injured, should such a woman be allowed to risk another pregnancy?

CASE 3.—Patient M. F., age twenty-one; born in United States, of Italian parents; gravida i; unmarried.

Admitted to Sloane Hospital October 21, 1920, from the Neurological Institute, where she had been under treatment since June for epilepsy and syphilis, having had several injections of salvarsan.

Father died at 58 years of age in an insane asylum. Mother was alive and well at fifty-six years of age. Two brothers alive and well. Two brothers died from tuberculosis. Mother's pregnancies and labors all normal and easy. None of the other children had had epilepsy or shown signs of mental deficiency.

Patient had measles at seven months of age. Fell down stairs at four years of age, resulting in a scar over left frontal region. Otitis media, resulting in deafness at thirteen years of age. Disturbed vision after thirteen years of age. Influenza in 1918. The child attended school from her sixth to her fourteenth year, reaching the sixth grade. Left because she was the biggest girl in the class. At home was tractable; fond of dancing; had many girl friends; worked spasmodically.

Menstruation began at fifteen. Was never well established; irregular and of short duration. Last period not definitely known.

The epileptic history commenced with menstruation. Convulsions usually occurred about twice a month, always at night after the patient had gone to bed. Attack of short duration, followed by intense headache. Attacks had become very much more frequent during the few weeks previous to entering the hospital, with almost constant headache, and an increasing mental disturbance since pregnancy started, in spite of treatment.

Physical examination showed a moderately well-nourished young woman. Would not respond to questions and appeared definitely psychopathic. Temperature and pulse normal. A small scar over left frontal region. Skin and mucous membranes normal. Eyes: Ocular movements and pupillary reactions normal. Small perforation in the left ear drum. Tongue not scarred. Teeth cupped but not pegged; several carious stumps. Cervical glands small but palpable. Thyroid negative. Heart and lungs negative. Breasts enlarged and secreting. There was a moderate lordosis in the lumbar region of the spine. Abdominal examination revealed a uterus about the size of a seven months' pregnancy. Fetal heart present. Extremities negative. Deep reflexes active and equal; no abnormal re-

flexes; no tremors. Axillary, inguinal and epitrochlear glands not palpable. Pelvic measurements normal. Vaginal examination, negative except for a normal 28-weeks' pregnancy. Position vertex L. O. A.

Laboratory Findings. Urine, negative. Blood count: hemoglobin 55 per cent; red blood cells, 3,860,000; white blood cells, 8,600; polynuclears, 77 per cent. Blood chemistry, negative. Blood Wassermann + + + +. Cord Wassermann negative.

The patient was kept in the hospital four days, pending a decision as to the course to pursue. She had no nervous symptoms up until the evening of the fourth day, when about midnight she began having what were apparently epileptic seizures. From midnight until 11:30 the next morning she had forty convulsions in all, of varying lengths and severity. She was given morphine, chloral and bromides, but without avail. She died at 11:35 A.M. from exhaustion and shock.

Autopsy Findings. Brain: both gross and microscopic examination negative. Heart, negative. Lungs showed healed tuberculosis nodules in both upper lobes. Endocrine glands carefully examined and found negative. All other findings negative.

DISCUSSION

DR. J. MILTON MABBOTT.—I would like to ask whether there were any spirochetæ found, either during life or after death, in view of the fact that she had had so many doses of salvarsan and still had a 4-plus Wassermann.

DR. HAROLD BAILEY.—I recently saw a case of chorea starting about the fifth month, which was of the extreme type. The woman was constantly moving. This case was treated by doses of luminol, 1½ grains three times a day and the dose later dropped to ¾-grain. The seizures became milder within a few days and eventually ceased and she went on to term and was delivered of a normal child. In our service we had felt it wise in these cases to empty the uterus.

DR. FRANKLIN A. DORMAN.—In my service at the City Hospital there were in the last three or four months two cases of marked chorea in young women. The spasms were extreme; they could not sit out of bed. We treated them as a toxemia, and also prescribed luminol. Their condition continually improved and as they came near term we were able to have them sit out of bed. The labors were rapid and normal. I believe that luminol is exceedingly helpful in this condition.

DR. GORDON GIBSON.—There is one thing in cases of epilepsy which we worked out several years ago at Kings Park in trying to refute Dr. Pierce Bailey's idea of the number and character of the cortical cells. We made a great many nitrogen partitions and found if we could keep the nitrogen down to a total of 4 per cent these patients would be free of seizures, and we could predict when they were going to have fits. During that year we did 30 autopsies and upon careful examination of the liver we found that all these cases had cloudy swelling of the liver cells with deformity of the intra- and interlobular veins.

DR. WILLIAM E. STUDDIFORD.—We have had one other case at the Sloane recently, in which luminol was used with very unsatisfactory results with persistent recurrence of headaches. The woman gave a history of one pregnancy which she carried through with chorea developing in the later months of pregnancy. A second pregnancy was gone through without chorea. A third pregnancy developed five months after the second and chorea appeared about the second month and was very severe. There were also intense headache, and mental disturbances, and, notwithstanding the use of luminol, induction was finally carried out in that case.

Dr. Samuel H. Geist presented the following case report: **Pyonephrosis and Pyoureter Following Intentional Ligation of the Ureter.**

Experimental investigation on the result of ligating the ureter in a noninfected kidney has demonstrated that one of two results usually obtains, either atrophy of the kidney or the development of a hydronephrosis and hydroureter. Ligation of an infected ureter, however, results almost invariably in a pyonephrosis. The case described was one in which a ureter, apparently noninfected, was ligated with the resulting pyonephrosis and pyoureter. Undoubtedly there must have been at the time of the ligation a low grade infection present.

The patient M. F., age forty-two, married, was admitted to Mount Sinai Hospital on March 14, 1921, discharged April 23, 1921. She had been married twenty-six years, had had seven children, the last nine years ago. Four months previously she was operated upon at Lebanon Hospital for vaginal bleeding. At that time supravaginal hysterectomy and appendectomy were done. She developed a postoperative pneumonia and pleurisy. Following the operation she was catheterized for two weeks. At the time of admission to Mount Sinai Hospital she was voiding four times daily, no hematuria, dysuria, or nocturia. The chief complaint was that she dribbled urine constantly.

Her physical examination was negative except for the local findings. The urethral orifice was gaping, there was a moderate cystocele, cervix was intact, somewhat fixed and to the right of it was felt a small cystic nontender mass about the size of a plum. Cystoscopic examination revealed a normal-sized bladder with left ureteral orifice normal, the right orifice gaping, the bladder drawn out into a distinct pouch on this side, resembling a diverticulum. At the site of this orifice there was no evidence of inflammation. On the left side a catheter was inserted to the kidney pelvis and drained normal urine. On the right side a catheter passed up the ureter for a distance of 3.5 cm., where it met with an obstruction. No urine was obtained through this catheter. Methylene blue solution was introduced into the bladder but none escaped into the vagina. Indigo-carmine was injected into the muscle, the bladder urine was voided blue but the fluid in the vagina remained colorless. It was concluded that there was no leak from the bladder into the vagina, that the kidney on the right side was not functioning normally, and that the leak must occur through the cervix. A phenophthalein test showed normal function of a left kidney, 450 c.c. of urine excreted in two hours with 65 per cent of phthalein excretion. The blood chemistry also was normal.

It was decided then to implant the ureter on the right side into the bladder. A laparotomy was done by Dr. Brettauer, exposing the right ureter. Many adhesions were found about the cervix and closely binding the ureter to it. The ureter itself was enormously dilated, the diameter being approximately that of an adult thumb. Close to the cervix an obstruction could be demonstrated, though no communication between ureter and cervix was observed. In view of the enormous size of the ureter and the fact that it contained, when cut across, a clear watery fluid, and there having been no history of temperature or any clinical signs suggesting an infection, it was decided to ligate this ureter in the expectation that the kidney would atrophy. This was done, a small portion of the ureter was resected close to the pelvis for histological examination and the abdomen closed, one small drain being inserted to the ligated ureter. About one week after operation the patient began to complain of pain in the right lumbar region, she had chills and a temperature which rose at times to 105°. A white blood count showed 30,000 leucocytes with 90 per cent polynuclears. Physical examination revealed a large tender kidney. A diagnosis of pyonephrosis

was made and it was then decided to do a nephrectomy and ureterectomy. This I did through a lumbar incision which exposed an enormously distended kidney and ureter. (Specimen shown.) Kidney and ureter were removed and drains inserted one to the bed of the ureter, where it had been ligated and the other to the kidney bed.

The pus from the ureter showed a streptococcus hemolyticus. The patient made an uneventful recovery and was discharged from the hospital well. On discharge her kidney function was normal.

DISCUSSION

DR. H. D. FURNISS.—I think it is usual in all these cases of vesicovaginal fistula, especially if the tract is long from the opening in the vagina to the end of the ureter, to get dilatation of the ureter as a result of constriction of the tract. In this case we have a pointer that the tract was at least 3.5 cm., because he could get a catheter only that far in the ureter. That means it was at least that, but it may have been more.

I think in the treatment of these cases we must establish more than the fact that we have a ureterovaginal fistula. We must know the functional damage which has been done to the kidney and whether or not there is infection. In this particular case there was normal elimination of indigo-carmine and phthalein from the left side, but none from the right, which indicated a marked deterioration of the function of the kidney.

I would like to say right here, however, that indigo-carmine shows lessened function quicker than phthalein, and that you get a complete absence of indigo-carmine at times, especially if there is pus in the urine, when the phthalein elimination will be only moderately depressed.

My criticism is that with a long fistulous tract and evidence of functional damage to the kidney, it was unwise to attempt an implantation and that the better procedure would have been to plan a nephrectomy.

NEW YORK ACADEMY OF MEDICINE
SECTION ON OBSTETRICS AND GYNECOLOGY
STATED MEETING, HELD MAY 24, 1921

DR. HAROLD BAILEY IN THE CHAIR

DR. F. W. RICE reported **Two Unusual Cases of Puerperal Sepsis with Gangrene of Extremities.**

CASE 1.—Thirty-eight years of age, married, para-iii, colored, born in the West Indies, entered Bellevue Hospital April 15, 1921, in the first stage of labor. She had previously had one full term delivery and one spontaneous two months' miscarriage, both uncomplicated. For the past ten days before admission, she had had sore throat and an irritating cough. When seen in the clinic three days previously, her tongue was coated, cervical glands enlarged and tender, throat slightly congested; heart and lungs negative. Her Wassermann reaction was negative.

Labor began at 1 A.M., April 15, the membranes ruptured spontaneously at 3 A.M., and she was delivered spontaneously at 5:35 A.M., after four and one-half hours, of a normal, living female child, weighing 4055 grams. The position was an R. O. P. which rotated spontaneously to R. O. A. Delivery of the head was difficult due to slight narrowing of the anteroposterior diameter of the outlet, caused by a prominent tip of the sacrum. Manual pressure on the fundus aided

delivery of both head and shoulders. A mucous membrane laceration resulted, requiring two superficial interrupted sutures of No. 2 chromic catgut. Light chloroform anesthesia was used throughout. The placenta was separated by Schultze's mechanism and delivered by simple expression; the secundines were complete; there was no postpartum hemorrhage. One c.c. of pituitrin was given hypodermically, followed by one-half a dram of aseptic ergot. No vaginal examinations were made.

On the second day postpartum, the temperature, previously normal, rose to 103.9° F., and the pulse to 130. The coryza and cough became more severe. There was headache; the conjunctiva were injected; the skin was dry; abdomen slightly distended, the fundus at the umbilicus, hard, but there was tenderness over the bladder. On the third day postpartum, the temperature went to 105° F., the face and entire trunk became hyperemic, the lips dry and cracked. The fundus was then five fingers, up, with scant lochia and perineal repair clean. On the fourth day the temperature was still 104°; white cells 14,000; polymorphonuclears 74 per cent; lymphocytes 24 per cent, and transitionals 2 per cent. The catheterized urine showed two plus albumin, with many granular casts, quite a few pus and epithelial cells and some unorganized debris. On the fifth day the coryza, cough and rash were all improved, but the patient was irrational; the lochia were thin, watery and odorless; the uterus four fingers up, not tender, and the perineum clean. The tongue was heavily coated, white, with small red areas. A diagnosis of scarlet fever was made based on the rash, tongue and throat conditions. On the sixth day the temperature dropped to 100°, the rash disappeared, but the patient became more irrational, refused liquids and complained of feeling very weak. Her pulse was almost imperceptible, and she plucked at the covers and removed her gown repeatedly.

On the seventh day, the blood culture was reported sterile at forty-eight hours. She appeared markedly improved, though the eyes and throat were still congested. A catheterized specimen of urine showed a trace of albumin with a few pus cells and a few granular casts and much unorganized debris.

On the eighth day the patient was still expectorating white mucus. The night before restraints had had to be applied. The pulse continued imperceptible. For the first time she complained of "sticking pains like pins and needles" in the soles of both feet. There was tenderness and pressure just beneath the internal malleoli of both ankles, none elsewhere. That night there was numbness in the left foot, most marked in the toes and inability to move the toes; no swelling was present. There were sharp intermittent pains and tenderness over the calf muscles and feet.

The ninth day postpartum the patient had a chill in the early morning with a rise in temperature to 102.4°. The lochia became yellow but remained odorless. The eyes and throat were about normal. The fundus was still three fingers, soft, not tender, and the perineum was clean. The left foot showed small, hard, tender veins over the dorsum. Thrombophlebitis was diagnosed. Local treatment included dry heat, cotton covering, and elevation.

On the tenth day, the temperature was 104°, white blood cells 24,000, with 87 per cent polymorphonuclears; the lochia profuse yellowish brown in color. There were marked cyanosis and coolness of the left foot, from the ankle down; edema of the dorsum and a hyperesthetic area, 1½ inches wide, from a beginning line of demarkation in the metatarsal region down. She complained of pain in the right foot and was incontinent of feces.

On the eleventh day postpartum, the temperature ranged between 101° and 102°, the pulse from 140 to 150, the heart sounds were weak and a systolic apical

murmur had appeared. The area on the left foot had spread above the ankle; there was complete anesthesia below and some maceration of the skin. There was a new extension of the edema to the knee with redness and tenderness to the middle of the calf. The right leg showed redness and tenderness over a third of the calf and down. The right cheek showed a swelling in the morning which by afternoon had become ecchymotic, with a similar metastatic area on the third finger of the left hand. The patient perspired freely.

That evening the right foot became cold and cyanotic, but the dorsalis pedis artery was still plainly palpable; this could not be done on the left, however, which was black and cold with the area extending higher medially. There was tenderness higher on both legs.

On the twelfth day postpartum, the rectal temperature was 108°; pulse 148. The patient was unable to speak. The left foot showed extension and bloody discharge. The patch on the right cheek was bleeding. There was a new area of ecchymosis on the right buttock. The left arm was painful when moved and the right was cold. The patient became unable to swallow; dyspnea and pulmonary edema developed rapidly; the pulse became weak and the patient died at 1:00 P.M.

CASE 2.—Thirty years of age, married, para iv, born in the United States, admitted to Bellevue Hospital on April 21, 1919, in the first stage of labor. Her past history was negative except that she stated that she had had puerperal troubles with all her previous children, though her three labors had been normal and spontaneous.

Onset of labor was at 12 M., and at 9:45 the fetal heart became irregular and one vaginal examination was made. Finding the cervix fully dilated, the membranes were ruptured artificially. She was delivered spontaneously of a normal, full term female child, in L. O. A. position, at 10:15 P.M., and the secundines were removed by the Credé method at 10:25. No postpartum hemorrhage or perineal tear. Half a dram of aseptic ergot was given hypodermically. Only one rectal and one vaginal examination had been made. Preparation included a soapsuds enema. Ether was used.

The patient had an uneventful history the first two days after delivery except for cough on the night of the second day which persisted for two days. On the morning of the third day her temperature was 101°; at 2 P.M. she had a chill of five minutes' duration, headache, and a temperature of 104° F. The fundus was three fingers below the umbilicus, firm and slightly tender. The lochia were slightly foul. The lungs were negative. The fundus remained high and firm, and not tender thereafter, until the ninth day when it was much lower. From the fifth to the ninth day the lochia were profuse, thick and foul. That night the patient had chilly feelings.

At 4 o'clock the next morning the temperature was 106° by mouth, and that day a blood culture was taken and reported sterile in forty-eight hours. The severe headache persisted. The tongue was moist and only slightly coated. A soft systolic apical murmur had appeared. The abdomen was distended and a palpable spleen made out.

On the fifth day postpartum, a catheterized specimen of urine was negative for albumin. The white blood cells numbered 15,000 with 76 per cent polymorphonuclears. The Wassermann test was negative. The patient was perspiring freely, the temperature being between 101° and 103° F. From the sixth to the ninth days the temperature ranged from 101° to 104° F. The abdomen remained distended slightly. The patient's general condition improved. Another blood culture taken on the seventh day was reported sterile after forty-eight hours.

On the ninth day the patient said that during the previous night she had had gradually progressive "drawing pains," aggravated by motion in the lower shin and outer side of the left ankle. Examination revealed a slightly reddened area two inches in diameter, on the anterior surface of the right tibia, just above the ankle, not elevated, tender on pressure. About 2½ inches above the left ankle on the external surface of the calf there was a localized swelling slightly reddened and extremely tender on pressure. That evening these involved areas showed definite lymphangitis, the processes were spreading rapidly, and the swelling in the left leg was much worse.

On the tenth day postpartum, with temperature still 102°, the local condition became more marked, and from this time the pain was severe and persistent. Later the right ankle improved, while the left showed increased swelling, redness and tenderness, and in the afternoon ecchymotic spots appeared over the external and dorsal surface of the foot and ankle. The temperature fell to normal.

The twelfth day found the area on the left more ecchymotic and the temperature rising. The catheterized specimen of urine showed no albumin. The white blood cells were 20,000 with polymorphonuclears 90 per cent. The following day a definite line of demarkation appeared at the left ankle laterally and over the dorsum of the foot, with coldness, cyanosis and anesthetic zone below it. Some pain reappeared on the right side, with redness and swelling persisting. On the thirteenth day a quick guillotine amputation was performed at the junction of the middle and upper third of the left calf. No attempt was made at closure for pus had burrowed along the muscle sheaths and fascial planes. The culture showed gram positive cocci, some short chains and some diplococci forms. The blood plate report was "hemolysis, no chain cocci." The day after the operation the temperature was 104° and continued to run a septic course. The patient continued to have severe pain in the left leg, causing insomnia and restlessness. Treatment had been symptomatic except for the operation and Dakin's irrigation. On May 12, the leg became more painful and showed signs of inflammation. On the following day it was worse. Under gas anesthesia an incision was made and several ounces of creamy odorous pus were evacuated from the extensor tendon sheaths. Three incisions were made and ample drainage afforded. The white blood cells were then 18,000. On the 14th day the amputation stump showed streptococci in both culture and blood plates while pus from the incision on the right leg showed gram-positive cocci—no chain effects.

Subsequently the patient's temperature has ranged between 101° and 103°. The stump and the wound on the right leg almost healed. A delay in giving transfusion was caused by difficulty in obtaining a donor. There seemed to be no apparent reason for the continued temperature. The general condition remained about the same.

DISCUSSION

DR. BAILEY.—In the same hospital service I saw a third case almost a duplicate of the one Dr. Rice presented. The blood culture was at first negative but later showed a nonhemolytic streptococcus. At about the tenth day postpartum she had severe pain in the middle of the tibia. Nothing was found on palpation, but tenderness. On the third day after the beginning of the tenderness there was slight lymphangitis below the area. On the basis of the resemblance of this case to the previous ones, the patient was transferred to the surgical side. An incision was made and there was no pus but the tissues were edematous. On the third day the nonhemolytic streptococcus was found. The temperature dropped after opening the leg and did not rise again. These are

probably three cases of streptococcic blood infection with abscesses occurring at a distance from the wound. I saw the leg that was taken off and the location of the abscess was along the peroneus longus tendon, apparently its origin was from a blood infection.

DR. WILLIAM M. FORD.—I might mention similar conditions that I saw on one occasion just before the epidemic of influenza of 1918. On a Dutch steamship Nieu Amsterdam a large number of persons died on the way to this port and there were a number of cases of influenza aboard when the boat reached New York. A dozen of these patients (more or less) were admitted to St. Vincent's Hospital; about half of them came to the surgical side with a history of having had influenza on the trip over, from which they had about recovered, but they had infections about the hands and feet, more particularly about the feet. The majority of these cases were similar to those reported. In each instance the condition followed a few days after influenza before convalescence was established. We were at a loss to say exactly how the infection occurred. We attributed it to streptococcic influenza; it was either coincident with or followed the influenza and the lowered resistance of the patients probably played a part. One patient died of empyema. The similarity of the cases just reported to those cases leads me to believe that there is no specific connection with labor, that the same thing might follow in any open wound or following an infectious disease, when the patient's vitality is unduly lowered.

DR. F. W. RICE also reported a case of **Eclampsia at the Sixth Month: Recovery without Delivery.**

The patient was a Porto Rican woman, twenty-five years of age, married, para-i, admitted to Bellevue Hospital on April 19, 1921.

Her past history obtained from her husband was that she was a healthy girl in every respect, except for appendectomy in 1919. She had been married nine months. Her last menses occurred on September 8. For the past two months she had had some edema of the ankles. The day before admission she complained of occipital headache for the first time at 1:00 P.M. That afternoon and throughout the night it continued with increasing severity. At 8:30 A.M. on April 19, the patient had her first convulsion, followed by a second one at 10 A.M.

She was admitted on a stretcher at 4:45 P.M. in a semicomatose condition, evidently in deep shock and could not be aroused by supraorbital pressure. There was some edema about the eyes and ankles, the heart was irregular, the sounds poor, the pulse almost imperceptible, 128; the temperature 101.6°. The blood pressure taken at three different times was 50-40. The abdomen was that of a seven months' pregnancy. There was a floating head and a fetal heart of 144, left and below. Vaginal examination revealed a long rigid cervix of 2.5 cm., the external os admitting the tip of the finger; the internal os was closed. Lumbar puncture revealed a clear fluid under normal pressure; some sugar was present; globulin was negative; the cell count was 6. The Wassermann taken later on was reported one plus; the colloidal gold reaction was negative. The catheterized urine boiled solid, with hyaline and some granular casts. Ten grains of camphor in ether were administered and the patient improved at once; the pulse became stronger, 88, and the blood pressure rose to 140-100. As high colonic irrigations were begun, the first convulsion since she had been in the hospital occurred. The second came on with gastric lavage of soda bicarbonate solution, leaving three ounces of castor oil in the stomach. The Magendie given from 7:30

P.M. to midnight totalled 17 mm. Between 8:00 P.M. and 2:30 the next morning six more convulsions occurred, lasting from 35 to 55 seconds each. Chemical examination of the blood obtained at the time of entrance showed nonprotein nitrogen 24 mg.; creatinine 1.5 per cent; sugar 90; uric acid 2.5 per cent. Hot air baths and high hot colonic lavage were given alternately from then on through the critical period. The patient passed a rather quiet night. Incontinence of urine and feces continued until April 27. Morphine had been given to its full physiologic effect. The patient's respirations continued at from 10 to 14 for the next three days. The temperature had become normal; the blood pressure 130-80.

On the twenty-first, her blood pressure was 162-110 after a night spent almost in mania. She refused and resisted all treatment, medication and nourishment for the next four days. Paraldehyde and fluids were given by the stomach tube. Hypodermoclysis, 1000 c.c., was begun and continued for four days.

On the twenty-third day the blood pressure rose to 206-120, and the patient complained of severe headache. The chemical examination of the blood at this time showed nonprotein nitrogen 26; creatinine 1.4; uric acid 3.0. The catheterized urine showed two-plus albumin with an occasional hyaline and granular cast. On the evening of this day the patient became delirious; her blood pressure went to 195-116.

On the twenty-fourth she had three more convulsions. After the administration of 5 mm. Magendie no more convulsions occurred. Deep coma followed. Her heart and lungs were negative. Irregular uterine contractions were noticed then and occasionally for the next two days. Vaginal examination revealed both the internal and external os one finger dilated; the canal 2.5, and the cervix softer than upon entrance. That evening her coma deepened; respirations were 13; pulse irregular, but of good volume and she perspired freely. The blood pressure was 160-110.

She was in coma and then in a semicomatose condition until the twenty-seventh when she was clinically much improved, was quite rational, had no incontinence of urine and feces. Her blood pressure was 180-115.

On the twenty-eighth and twenty-ninth, the catheter urine had pus cells and albumin but no casts. From then on her course was uneventful. Eliminative measures were continued throughout.

On May 2nd, induction of labor was decided upon, and a No. 3 Voorhees bag inserted at 4:30 P.M. It was expelled at 2:45 the next morning. She was delivered spontaneously at 4:20 of a macerated female stillbirth of 1505 grams. When the membranes ruptured a thin brown sweet smelling amniotic fluid was noted. The secundines came away complete; the placenta showed many large white infarcts, and most of the cotyledons were of rubber-like consistency. No anesthesia was given.

The puerperium was perfectly normal. On the seventh day postpartum her blood pressure arose to 150 and remained so for four days. The blood chemistry test at this time showed nonprotein nitrogen 27.5; creatinine 2.5; uric acid 3.2; carbon dioxide combining power 36 per cent. She complained of sore eyes and buzzing in the head. By the thirteenth day the blood pressure had fallen to 118 with cessation of symptoms.

DISCUSSION

DR. BAILEY.—The interesting feature in this case is the blood chemistry. As I understand, the blood was normal throughout, yet the woman had albumin and casts. Under such conditions it is rather unusual that the blood should have been normal.

Dr. William M. Ford reported a case of "**Spontaneous Intraperitoneal Pelvic Bleeding.**"

This case is presented for two reasons. First, on account of the unusual character of the pathology. Second, in the hope that out of the experiences of those present some explanation of the operative findings may be forthcoming.

The patient was seventeen, menstrual history was normal in all respects. She was married one year ago and separated from her husband after six months. There were no pregnancies. The regular period which came on December 8 was free from any unusual symptoms. Two weeks later, on December 22, while at work, the patient experienced a sharp knife-like pain in the region of the sacrum and became unwell; on the following day she was seized with cramps in the lower abdomen which after a day became more generalized. As her bowels, which were usually regular, had not moved for several days, she took a dose of Epsom salts and after this had acted the pain became more or less localized in the right lower quadrant. Gradually it became worse so that on the third day of her illness, opiates were administered to control the pain. The distress in the right lower quadrant, the backache and the flowing continued at the time of her admission to the hospital, which was on December 29. Up to this time she had only vomited once and then after taking salts.

Examination revealed tenderness at McBurney's point and extending less acutely over the lower zone of the abdomen. The abdomen was not rigid. No mass was palpable. Temperature on admission was 103°, pulse 114, and respirations 24. White blood count 7000; polynuclears 86 per cent. Red blood count and hemoglobin on January 2nd were 3,500,000 and 70 per cent, respectively.

I saw this patient for the first time after she had been prepared for operation, with a diagnosis of appendicitis on December 30, 1920. A McBurney incision was made over the tender area on the right side. Before opening of the peritoneum, the presence of free blood in the abdominal cavity was noted. After opening the peritoneum and withdrawing the appendix, an actively bleeding point was found on the side of the appendix away from the mesentery about 1 inch from the base.

As the tip of the appendix was slightly bulbous and as there was a small amount of plastic exudate seen on its tip, it was clamped and cut away. The stump was ligated with plain gut, cauterized with carbolic and alcohol and not inverted. The wound was then closed. The presence of free blood prompted a median incision for the purpose of examining the uterine adnexae. About 2 ounces of partly clotted blood was sponged out of the culdesac. The tubes were examined in turn and in each the process appeared to be similar. Both were patent and neither was enlarged. There were no adhesions, in fact, they appeared to be quite normal save for their peritoneal covering. This was so intensely engorged that the small blood vessels formed a finely reticulated lacework over the entire surface. About 1½ inches from the cornu on each tube was an actively bleeding vessel of minute size. Both ovaries were normal, the right containing a well-formed corpus luteum of recent origin. A figure of eight suture about each bleeding point controlled the hemorrhage from the tubes and the abdomen was closed.

Convalescence was uneventful. The patient continued to flow until January 6. On January 2 she complained of slight rheumatic pains in the left shoulder which lasted for a day or two and disappeared spontaneously. Blood cultures were negative and the coagulation time was seven minutes. The family history was negative. She was discharged cured on the sixteenth day after operation.

Dr. D. N. Barrows reported a case of **Functioning Tube after Abortion of Tubal Pregnancy.**

Most authorities agree that a tubal abortion, unoperated, may be followed by one or more uterine pregnancies, and no doubt many here tonight can remember cases from their practice in which this has occurred. But few, however, can demonstrate the fact shown by this case, that a tube which has been the site of an ectopic gestation is able to resume its normal function in sixteen months. This case proves the statement made by Graves, Kelly, and many others that the mucosa of tubes the site of tubal abortions, even where the hematocele is of large size, sometimes heal spontaneously by absorption of the blood clot, with or without symptoms of infection, or mild toxemia, going on to complete health and later normal pregnancies. If the tubal pregnancy which ends in tubal abortion embeds itself less deeply in the tubal wall than such a process that goes on to rupture, this would explain why the tube in this case was not sufficiently injured to prevent its complete restoration to function. It would also resemble the findings in a case of tubal abortion cited by Howard Kelly where no placental villi were found in the wall.

The case is that of a woman, twenty-eight years of age, admitted to Bellevue Hospital, December 23, 1917, complaining of uterine hemorrhage and severe knife-like pain in right side. Menstruation was of the 28-day type, lasting four days, and painless. The last menstruation occurred October 22, 1917. On December 23 she was seized with severe knife-like pain in the right side, associated with vaginal bleeding. A diagnosis of tubal abortion was made and on laparotomy the products of conception were removed from the right tube, consisting of large and soft blood clot. Otherwise the tube and ovary appeared to be normal and uninjured. The blood count at this time was as follows: Red blood cells, 2,670,000; hemoglobin 75 per cent; white blood cells 7,000; polymorphonuclears 60 per cent; large lymphocytes 9; mononuclears 31. The pathologic examination showed a large blood clot with irregular pieces of pale placenta-like tissue, scattered chorionic villi, and many foci of pus cells. The diagnosis was tubal abortion with escape of the infected products of gestation into the abdominal cavity. She was found to have a retroverted uterus. She was fitted with a pessary and followed up for several months, and then lost sight of.

The woman was readmitted to the hospital February 6, 1919, when a diagnosis was made of chronic salpingitis, a displaced uterus and lacerated cervix. She was having constant vaginal bleeding, but no pain or nausea. At operation a dilatation and curettage, a trachelorrhaphy, and a left salpingo-oophorectomy were done. The right tube and ovary were normal; the left showed hematosalpinx with infiltration and adhesions. The blood count at this time showed hemoglobin 90 per cent; white blood cells 9,000; polymorphonuclears 78 per cent; large lymphocytes 18. The urine was normal. The temperature was irregular for several days following operation; then became normal, and the patient was discharged with a good result. The uterus was forward in good position. On June 3, 1919, she reported that she had menstruated six weeks before and was having pain all over the abdomen. August 26th examination showed the uterus enlarged to the size of a four months' pregnancy. The uterus was in good position and apparently adherent to the old scar. When the patient was last heard from the pregnancy was progressing normally, conception having occurred via the remaining right tube, the former site of the tubal abortion.

An interesting case reported by Heaney of a tubal abortion, followed by bilateral tubal pregnancies, one tube being removed and the other resected at the

ampullar portion, is one in which the probabilities are very much like those in the present case. Hadden of Oakland, Cal., has reported a case with three ectopic pregnancies, occurring at intervals of about a year. Also we know from a case reported by Dr. Henry C. Coe, cited by Howard Kelly, that a tube containing a lithopedion near the uterine end may be the site of a subsequent ectopic gestation at the distal end.

DISCUSSION

DR. HARRY ARANOW.—As I understand the case, a hemisalpingectomy was performed on the other tube. There is one possibility and that is that the other tube might have opened after ligation. A tube that has been ligated and resected will sometimes open and become patent, as has been proved. It is possible that in this case the left tube may have become patent again.

DR. WILLIAM P. HEALY.—It is interesting that this tube which had some lesion in it that led to the tubal implantation of the ovum, recovered. Whatever the lesion was, it caused the ovum to remain in the tube and prevented its passing on into the uterus. I am of the opinion that a lesion that kept the ovum in the tube for several weeks before it aborted must have caused considerable change in that tube, and by improving the circulation must have cleared up a moderate amount of stenosis. This lesion gave no indication for removing the tube, as macroscopically it appeared normal. Furthermore, it was the only patent tube the patient had, hence it was reasonable to leave the proximal portion of the tube, inasmuch as we know that where even a small portion of the proximal end of the tube remains intrauterine pregnancy may take place. I think we are apt to be more conservative than formerly in dealing with inflammatory conditions so I see no reason why we should not be just as conservative in dealing with ectopic gestation.

One word more; I have seen specimens of ectopic pregnancy in which the ovary was a part of the exhibit. In my opinion it is very rarely necessary to remove the ovary.

DR. CHILD.—In my opinion tubal pregnancy is no reason for the removal of a tube and ovary. The taking out of a tube because of tubal pregnancy is little more rational than the taking out of a uterus for abortion. The only reason for removing the tube in tubal pregnancy is because the tube is so diseased as to make it a menace to the woman and of no value for future pregnancy. I should like to know why the opposite tube was not inspected at the time of the operation. It is quite important to always inspect the tube of the opposite side, especially if there is any question of the removal of the tube in which the pregnancy has occurred. If there is a healthy, patent tube on the opposite side you may do differently than you would if the tube on the opposite side were occluded. I have one patient with two children born after the removal of the right tube for a hopelessly diseased tubal pregnancy when I inspected the opposite tube and found it occluded. It was opened and eleven months after the woman gave birth to her first baby and she has since had a second child, neither of which would have been born if the opposite tube had not been inspected and opened. I find that the tube will involute following tubal abortion just as the uterus does after a normal pregnancy provided it has not been injured.

DR. BAILEY.—Why was the repair not done at the first operation?

DR. BARROWS.—The left tube was diseased at that time but the patient was in no condition to have the repair done. She could not have stood a thorough operation. The cornu was excised with the tube, but the ovary was fairly free

from involvement, which eliminates the possibility suggested by Dr. Aranow that conception might have occurred in the stump of the left tube.

When we operated on the left side the ovary was found to be bound down by adhesions and for that reason was taken out.

The conclusions are: 1. Tubal abortion does not necessarily destroy the function of the fallopian tube. 2. Such a tube need not always be removed.

DR. O. A. GORDON read a paper entitled **Conservative Treatment of Abortion; Conclusions from Five Hundred Thirty-two Consecutive Cases.** (For original article see page 521.)

DISCUSSION

DR. C. G. CHILD.—At the City Hospital we pursue an almost directly opposite course from that described by Dr. Gordon in the treatment of threatened and inevitable abortion. In cases of threatened abortion, I hold no great difference with him, except when he states that he allows these patients up on the fourth or fifth day. I see many cases where the cervix is so lacerated as to allow the ovum to prolapse into the vagina when the woman is on her feet, and if we allow these patients up too soon they will abort. I think these cases should be kept in bed and under observation for at least a week.

I do not believe the curette has any use in the treatment of abortion. It should never be mentioned in connection with abortion except to condemn it. This is no time to curette the uterine cavity, because you are very apt by this means to spread infection that may be present. I also believe it is worse than folly to leave the uterus with contained infected products of gestation, it is poor surgery. It is certainly illogical to say that you are afraid to remove the products of infection lest you may infect the uterus when it is already infected.

DR. TOVEY.—I do not think the uterus should ever be curetted. We had an experience meeting recently where everyone confessed to having penetrated the uterus once, twice or oftener. In discussing the question as to what course to follow, it was the concensus of opinion that the uterus should be left alone and the patient watched. I had one patient who had been curetted three or four times, and I finally did a hysterotomy and I found a piece of gauze that some one had scraped over but had not removed. The best treatment for the practitioner to use in the home is to allow the case to ''rot out.'' With that course you get a lower mortality. In a hospital service under aseptic precautions you may go in and clean out the uterus.

DR. HEALY.—It is a very illuminating thing to have 500 cases reported so concisely after having been treated carefully by one person. It is not like a number of cases collected from numerous operators, but is valuable in that the study has been worked out in one institution under one method of treatment. My attitude, however, is directly antagonistic to that form of treatment, based on my experience. One cannot criticize the results in this series of cases; we cannot hope to get better results by any method of treatment so far as the immediate results are concerned, but I want to go a little further and look ahead. The answer as to the value of treatment does not arrive when the patient leaves the hospital in good condition, but later one may find it in ectopic gestation or sterility in these cases that have been treated conservatively. There are no facts by which I can verify or demonstrate this statement, but I believe these patients treated conservatively are less likely to have tubes free from dis-

turbances than patients properly treated surgically. Take the large number of aseptic cases. Dr. Gordon says his cases were bleeding on an average of eleven days. If those cases had within twenty-four hours been taken to the operating room and, under general anesthesia, the uterus emptied—not brutally, but very carefully—they would in a few minutes have been in a clean condition with nothing hanging over them and would have gone on to smooth convalescence. Now contrast that with the patient bleeding eleven days in whom a bivalve speculum is introduced without anesthesia and the vagina packed tight. The vagina has been cleansed before packing, but you are introducing a foreign material into the vagina for twelve or twenty-four hours. I wonder how many of you have removed such a packing after it has been in the vagina twelve hours. Take into consideration that if the woman is not catheterized, she voids over the gauze packing, and after twenty-four hours you have a rather foul condition. Then you are not certain that when you remove the gauze the products of conception will come away. They may not have come away, or she may still be bleeding and will have to be repacked. In my judgment you are gambling when you use this form of treatment; you are gambling with the possibility of future pregnancy. I cannot see any gambling with a properly conducted surgical treatment at all. If we are going to endorse this form of treatment we should remember that the patient may be improperly packed just as she may be improperly curetted. We have to consider which is the safer method of treatment in the hands of the average man in practice. I do not know whether in Dr. Gordon's cases the cervix was packed but if any packing enters into the cervix there is great risk of infection; if it is only in the vagina of course the risk of infection is less.

Dr. Gordon stated that in 18 cases that were curetted the average number of days in the hospital was nine. But as I understand it, they did not curette unless packing failed to control the condition. They had to wait a few days to know that, so this makes the stay in the hospital several days longer than if they were curetted at once.

I want to say that in an experience extending over a good many years in the handling of incomplete abortions in a strictly surgical way, I am of the opinion that the morbidity is on the average no more than you would expect when you consider the large number of induced abortions, and the stay in the hospital is as brief as one can expect to have it after any form of treatment. Furthermore the results so far as future pregnancy is concerned are better than with the best conservative methods of treatment where the patients are merely kept in bed and bleed longer than they do under surgical treatment.

DR. ARANOW.—This subject of the conservative treatment of abortion has been brought before the profession time and time again and we have acquired considerable literature on the subject. As Dr. Gordon has mentioned, we usually reach our conclusions on the basis of our personal experience. In private practice I think a man will have better success if he packs the inevitable cases. In the hospital there is always a physician to look after the patient at any time, but in a private house I think one feels safer if he has packed the patient tightly.

Another matter that comes into the reckoning in the hospital is that when one has curetted the patient and removed the products of abortion the patient is ready to go home in five to seven days in the average case, while under expectant treatment they remain eleven or twelve days or two weeks. In an experience of seventeen years at the Lebanon Hospital I do not remember of a marked reaction to a clean evacuation of the uterus in an aseptic case. Where there is prolonged bleeding if one cleans out the uterus the patient does much

better. In septic cases in which the uterus is large and boggy the products of abortion may be removed by the placental forceps; these cases should not be scraped.

DR. M. O. MAGID.—While I have not treated as many cases as Dr. Gordon reports, I, too, have not used a curette in the past eight years. We get along very well by packing the vagina and then waiting for the cervix to dilate. In a great many cases, after the cervix dilates sufficiently, we can easily peel away all the products of the conception, with one finger in the uterine cavity. Where we cannot succeed with the finger a sponge stick or placental forceps will be of great aid. The curette has outlived its usefulness in these cases.

This paper will greatly benefit the general practitioner who feels that every case of abortion should have a dilatation and curettage. We very often see adnexal disease or other pelvic complications follow these "cleanings." Simple cases will empty themselves by the "packing method." The treatment of septic cases as outlined by Dr. Gordon, can be conducted properly only in a hospital, under the most careful aseptic precautions. The patients cited, that ran a temperature of 100° or 101°, were in my judgment not septic, but sapremic. The sapremic cases may become septic after the introduction of an instrument. The temperature may then go up to 103° or 105°. Once infected, these cases usually run a stormy course. I should like to ask Dr. Gordon whether all the cases with retrodisplaced uterus, whom he had lying on the abdomen for a number of hours each day, had shown any improvement? What about those cases that had congenital retrodisplacement? Had he used any method to determine which cases of retrodisplacement were congenital and which were acquired?

DR. GORDON.—Dr. Rice inquired as to whether we packed the cervix as well as the vagina. In a six or eight weeks' gestation that aborts there is, as a rule, no opening in the cervix so the cervix is not packed, but the vagina is packed tightly. If the cervix is open and there is something protruding it is removed. If the cervix is somewhat dilated it is packed, but no packing was introduced beyond the internal os in any case.

I am glad Dr. Child spoke as he did of the curette and that he has done away with it. Some of those who have discussed the paper evidently use the curette though they have not used that term. Dr. Child has spoken of removing decidua in a primigravada. The cervix is not dilated in an early abortion, and I do not see how you can remove the decidua without dilating the cervix. If you dilate the cervix you subject it and the uterus to considerable trauma. We do not feel at Bellevue that any one is sufficiently dexterous or possesses sufficient surgical finesse to remove the products of conception without subjecting the cervix and uterus to considerable trauma. A. H. Curtis says that in 70 per cent of the puerperal cases there are organisms in the body of the uterus which do no harm so long as they remain in the body of the uterus but are harmful if they get outside of the uterus. I have no more fear of a decomposing mass inside of the uterus than of one in the sigmoid. If we accept Curtis' observations we will not curette and allow these organisms to escape from the body of the uterus. Sampson has demonstrated the arterial system of the uterus both before and after curettage and has shown that the lymphatics in the uterus are not open in an abortion under six or seven months. If there is a fairly well formed placenta and an open cervix with placenta or cord protruding there is no reason why that placenta and cord should not be removed.

If you examine these cases which run a temperature you will find that they are mostly those in which there has been intrauterine manipulation, and sometimes the trauma from such manipulation is sufficient to cause subsequent sterility

or chronic parametritis. We know that we seldom get a pelvic abscess unless there has been a curettage or intrauterine manipulation. If in early pregnancy you dilate the cervix you might as well curette the endometrium.

Some one during the discussion said "properly curette," we do not know what properly curette means. We all know that the general practitioner and most of the hospitals are now curetting practically all of these cases, and this work is left to the house surgeon. The internes assume that every case of incomplete abortion is an indication for curettage.

In reply to Dr. Magid, I may say that of course we did not measure the degree of retrodisplacement in these patients according to the Sturmdorf method to determine whether it was congenital or acquired. We have assumed that it was not congenital and have had these patients lie on the abdomen for eight hours a day.

Department of Reviews and Abstracts

Conducted by Hugo Ehrenfest, M.D., Associate Editor

Collective Review

Blood Transfusion

By Gilman S. Currier, M.D., New York, N. Y.

THE early history of blood transfusion is a long one, and there are many excellent reviews of it.[8, 59] More progress has been made since the start of the World War than during its whole history. It is now a safe procedure in competent hands which can do no harm and yet be of immense value, especially if given early, before the need becomes too urgent.

INDICATIONS

If blood transfusion is looked upon as a homologous transplant of living tissue,[31] which has been shown to live for at least 30 days in the recipient,[4, 5, 6] the indications are infinite:

1. *In acute hemorrhage*, as substitute for lost blood, it offers immediate relief, when the addition of red blood cells is urgent for further maintenance of vital processes, since permanent degenerative changes have been shown to occur in the body when the exsanguinated condition persists for more than a few hours.[65] In spite of air-hunger, the amount of hemoglobin retained in the severest hemorrhage is above the point necessary to sustain life so that there is a factor besides the mere oxygen carrying power of the R. B. C.[69] While useful in gastric or duodenal ulcer, postpartum hemorrhage, placenta previa, ruptured ectopic gestation, ruptured uterus, typhoid hemorrhage, etc., transfusion becomes imperative when the R. B. C. are one million or less, and the hgb. 20 per cent in acute hemorrhage.[21, 47] When there is reduction of R. B. C. below 4,500,000 in 3 hours, 4,000,000 in 8 hours, 3,500,000 in the first 12 hours in wounded men, the patient dies.[19] If after transfusion a patient improves and then becomes worse, it is a sign of renewed bleeding, as a rule; if the bleeding is not certainly stopped, transfusion can help where saline or *any* other fluid fails.[28] The effect of saline intravenously is very transient, gum glucose solution intravenously is preferable.[28] Blood pressure is another valuable indicator and should not be allowed to go below 70 mm. of mercury.[5, 28] At this level enters the factor of shock, usually combined with hemorrhage. If it is known that the patient has not bled unduly, a solution of gum glucose intravenously is quite as effective as blood, though no better, but easier to give,[25] where a boost of blood pressure alone is the most pressing need.[5, 28] Seventy mm. of mercury blood pressure would be no guide in a patient of a blood pressure of 200 mm.

originally, so that the original pressure or age must be considered. Knowledge of the amount of blood lost is a valuable guide, not available if it is a question of concealed hemorrhage; and although obstetrical cases seem to stand blood loss better than others (the average woman can stand 1250 to 1500 c.c. loss with little or no ill effect), several fatalities are reported in which the loss barely exceeded 1500 c.c.[89] Mere reinjection of serum, however, is not sufficient,[15] so that in cases of bad hemorrhage, while there are temporary measures available, nothing will supplant transfusion of whole blood.

2. *Prophylactic transfusion*, preliminary to, during or just after operation in cases of postoperative hemorrhage or shock,[16] is also indicated in uterine bleeding from malignancy, for fibroids and most conditions described above (1), when prolonged or large hemorrhage is threatened.

3. *To increase coagulability*, as a styptic, where the serum and plasma are most needed, but alone will not suffice. They will work best in the form of whole blood in purpura, hemophilia, and hemorrhages due to the blood diseases; also in hemorrhage of the newborn, for which it is a specific[47, 70] when the coagulation time of the newborn is increased;[70] in oozing from the uterus of a patient who has already lost much blood and in whom the uterus will not contract for that reason;[9] also in the slow oozing provoked by jaundice, more especially postoperative. Paradoxical as it may seem, citrated blood, although containing an anticoagulant, temporarily gives a slightly lower coagulation time in these cases than the whole blood, having equal hemostatic quality.[42, 88] If serum alone is used as substitute for transfusion, which it cannot rival, "serum-serique"[69] (two doses of 10 c.c. each) is said to be very effective (serum from rabbits in a state of anaphylaxis to horse serum). Peptone is also advocated,[85] as also whole blood subcutaneously.

4. *For stimulation of hematopoietic organs.* Transfusion represents more than the mere addition of a given bulk of blood in pernicious anemia, leucemia, secondary anemia due to chronic infection or malignancy.

5. *For toxic conditions*, such as postpartum sepsis or any acute or chronic infection; for bacterial endocarditis, where immunized blood should be more valuable than unchanged blood. "Immuno transfusion"[90] surpasses ordinary methods of serum therapy in septicemic cases inasmuch as we are dealing with compatible human blood immunized *in vitro*, showing definite protective substances which can be incorporated in indefinitely large quantities of blood transfused. They serve the double purpose of new blood and of antibodies. Repeated small transfusions of 250 to 300 c.c. blood are the only remedy at hand in conjunction with general therapeutic measures. Since 23 per cent of bacteriemias, due to streptococcus in postpartum patients, end fatally, and in thrombophlebitis, 50 per cent of the women (with bacteriemia) do not recover, early and repeated small transfusions should be tried, though they are less effectual if there be a local point of sepsis.[12, 47, 63] Puerperal anemia is another field where transfusion is a therapeutic adjunct to arsenic, etc.[79a] In eclampsia, whole human blood from male or female donor seems experimentally to neutralize the toxic effect of the patient's blood to a greater extent than mere dilution with so much fluid.[54] Benzol poisoning and illuminating gas

poisoning are benefited by withdrawal of blood which is replaced with quantities of fresh blood. It is even suggested that leprosy is improved by transfusion, but this seems doubtful.[45]

RESULTS

If good technic has been employed the results are always excellent— otherwise vary in proportion to the attention given to details. Occasionally, there will be an unavoidable reaction but with due care this will not be great. The individual necessarily profits by the operation because a definite volume of blood has been transferred to him, the R. B. C. of which will survive from one to two months,[4, 5, 6] as ascertained by later count.[6] The serum will transfer antibodies and the whole blood will stimulate the hematopoietic organs to renewed activity.

METHODS

Methods are numerous. There are many historic reviews.[8, 59] The direct vessel to vessel anastomoses are no longer done, other methods are so much simpler, equally effective, and do not mutilate the donor. Of the indirect methods the paraffined glass receptacle[36] has its limitations and advantages; the method of coating with paraffine has been simplified.[3] The two methods most used today are (1) the syringe-cannula method[44, 91] with its modifications in the form of three-way stopcocks,[26, 40, 83] the ball and valve modifications being too elaborate and too easily put out of order, and (2) the anticoagulant method of using citrate.[1, 34, 42, 88] Citrate has taken the place of hirudin and other anticoagulants. Strange as it may seem, it was found that the anticoagulant did not destroy the hemostatic quality of the blood in cases of oozing, jaundice, melena and purpura.[88] The amount of citrate used has been diminished to 0.2 per cent as a minimum,[42] the majority of men preferring 0.24 to 0.30 per cent when diluted with the blood.[35, 59, 62] From the simple intravenous set for injecting citrated blood, more elaborate methods evolved,[8, 24, 30, 65] but one can always rely on this method. There need be no fear of toxicity of sodium citrate if used in 0.24 to 0.30 per cent strength for 300 to 1000 c.c.[13] On the other hand, the citrate method is generally conceded to be a little more apt to give a very mild reaction.[8, 22] There is no question but that the citrate method is more convenient, although by the syringe-cannula transfusion larger volumes of blood can be given with less injury to the blood used.

TECHNIC OF CITRATE METHOD

A detailed description need not be presented here.[8, 22, 59] A neat way of entering the vein consists of first transfixing it with a straight intestinal needle.[86] Blood is received in a graduated glass which contains citrate enough to give a final dilution of 0.2 to 0.3 per cent (50 c.c. of 2.5 to 3 per cent sodium citrate dissolved in .85 per cent saline solution for 500 c.c. of blood). It is constantly stirred with a glass rod, care being taken to prevent contact with the sides of the jar or the arm. A large and free stream from the donor is essential. Reinjection of the blood into the patient can be accomplished in innumerable ways. The simplest is filtration through gauze into a bottle which has enough saline to fill the rubber tubing. Thereby, air bub-

bles are excluded while the needle is inserted into the vein. The blood may be kept warm by passing the tubing through a basin of water of the desired temperature, not hot enough to injure the blood. Slow infusion of the blood which in the beginning is somewhat diluted with the saline in the tube, allows one to stop before any of those rare strong reactions, not demonstrable *in vitro,* become pronounced enough to be dangerous. The rate of injection should depend largely on the patient's cardiac condition.

Donors should be subjected to a general examination, a Wassermann test, and must be free from diseases communicable by the blood stream: such as malaria, typhoid (walking), etc. They must be carefully grouped, preferably also matched against the future recipient; promiscuous transfusion without any tests is not to be countenanced. Available candidates should be on hand from Group 4. In case of emergency, great advantage is gained by knowing the reaction of some of the hospital help or other easily accessible individuals. This procedure is endorsed by many,[41] but to a degree contradicted in the report of the Interallied Surgical Conference where it is stated that, "fatal accidents have occurred from agglutination of the blood corpuscles by the donor's plasma, but that the danger of this is relatively small and, therefore, it may be disregarded at an advanced post."[64]

Isoagglutinins and Isohemolysins. The prefix "iso-" is used to designate that variety of agglutinin and hemolysin which is effective against the erythrocytes of another animal of the same species as that possessing the agglutinin and hemolysin.[52] Here lies the keynote to successful transfusion. All other details may be perfect, yet if the blood of the donor is incompatible with that of the recipient, grave danger may follow—agglutination may occur alone, but hemolysis is always accompanied by agglutination,[52] with very few exceptions.[57] Exceptions occur perhaps most often in chronic diseases, where repeated transfusions have been given.[15, 47] Easiest test to determine compatibility, if serum of Groups 2 and 3 is on hand: a single drop of blood from the finger tip is placed into a test tube containing 8 to 10 c.c. of physiologic saline or citrate solution. The tube is shaken to give uniform suspension. On each of 2 cover slips a very small drop of corpuscle suspension is placed; to one a drop of serum of Group 2, to the other a drop of serum of Group 3 is added. Serum and corpuscles are mixed on each cover slip, which is inverted over a hollow ground slide and examined under the microscope. Agglutination may take place in a few minutes, but it is safe to allow a half hour at 37° C. to elapse before a decision is made. Serums of various groups differ in rapidity with which they bring about agglutination: Group 3 takes the longest, Group 2 often 15 minutes to a half hour, Group 4, five minutes or less.[48] Serum in capillary tubes, sealed and preserved, lasts six months or more.[49] Many modifications of this test have been made,[11, 74, 75, 76] and it has recently been shown that dried sera do not keep as long as the liquid form.[37] If fresh serum, which has hemolytic as well as agglutinating activities *in vitro,* is used, a mistake may occur by the clumping, being massed or broken up, and the hemolysis then is recognizable only in a diminution of the number of cells remaining in the preparation; therefore, examination must be made immediately after setting up.[15] In newborn infants also it has been found necessary to match the baby's blood against the mother's,[29]

contrary to the usual custom.[14] The important thing to bear in mind is that it is the cells of the donor against the serum of the recipient that one ordinarily tries out, the donor's serum being so diluted that it is usually harmless. A medico-legal application has been worked out that makes use of the transmission of these reactions,[58] which, however, are not established permanently until the first or second years of life.[29] With slight changes the figures of the original grouping of Moss still hold good.[17] The amount of reaction *in vitro* is no criterion of how severe the incompatibility will be *in vivo*, therefore, it is necessary to have a perfect match, when grouping is done.

DANGERS OF TRANSFUSION

Three types of accidents may occur: (1) acute cardiac dilatation; (2) embolism of air (less dangerous than supposed) and of clotted blood, these two accidents and the one following should not occur with due care; (3) introduction of infection into the blood serum (syphilis, typhoid, malaria); (4) agglutination or hemolysis reactions of which there are three types: (a) following the use of compatible bloods—a slight chill and rise of temperature, (b) so-called hemolytic reaction following the use of incompatible blood, (c) severe reaction, rarely occurring in patients who had previously received many transfusions of blood from a donor of the same group, therefore, compatible in the ordinary sense. The first two accidents are prevented by adequate care and cleanliness and lack of trauma to the blood,[22] and proper tests; the last is unavoidable and manifests itself after the introduction of from 50 to 100 c.c. of blood, therefore, transfusions must be started slowly, so that they can be stopped in time to avert a catastrophe. Its symptoms are tingling pain, fullness in the head, distress about the chest, later, excruciating pain in the lumbar region; then follows cyanosis, labored breathing, slow pulse, loss of consciousness, urticarial eruption; finally, rapid pulse, cold and clammy skin, chill, high fever (103° to 105°), in all, the symptoms of anaphylactic shock. Jaundice and macroscopic hemoglobinuria develop later.[15, 22, 60] If the transfusion is stopped early and fluids (glucose) are given intravenously with adrenalin and atropine, the condition usually clears up. These reactions in cases where the blood has been properly grouped, are thought to be caused by the liberation of toxic substances, probably from platelets in the incipient stages of blood coagulation. This can be avoided by fairly large needles and short tubing, and, in case of obstruction or stoppage, by the use of a new needle and tubing.[49, 67, 77] Therefore, the cleaner the apparatus is, and the less the blood is injured, and the more quickly it is injected, the slighter will be the reaction. Citrate may slightly injure the cells.[22] A further explanation of this reaction, simulating an anaphylactic shock, and by it a possible means of avoiding it, may be found in the fact that the liquor obtained by grinding a toxic serum, has become nontoxic to cells (R. B. C. or leucocytes) to which it formerly was toxic.[10]

AUTOINFUSION

The most noteworthy progress in transfusion of blood, brought out in German literature during the war, is the procedure of reinjecting extravasated blood after modifying it, intravenously, intramuscularly, or intrarectally, a method originated by Thies[82] in 1914. The first im-

pression of this autoinfusion of blood is one of impracticability, but it is endorsed, especially for cases of tubal pregnancy, so unreservedly by such authorities as Bumm, Doederlein, etc., that it may be well to give it more careful consideration. In German work on transfusion not enough emphasis is placed on the value of grouping patients. This may account for some of the accidents simulating those resulting from hemolysis or anaphylactic shock. The proportion of citrate used in all their transfusion work is much greater than that used in this country.[80] Doederlein adds five cases of autotransfusion to a total of fifty-one in April, 1920. An outline of his technic is as follows: A soup ladle or large spoon or grooved retractor is used to remove the blood from the peritoneal cavity; this means less trauma to the blood than suction. The blood is allowed to flow, by gravity, into a funnel covered with several layers of gauze. It is filtered into an Erlenmeyer flask where it is mixed with 1 per cent sodium citrate solution in the proportion of 3 parts of blood to 2 of citrate and kept at body temperature. By means of an intravenous set it is poured into the inferior mesenteric vein, or a vein of the leg,[38] arm, or injected intramuscularly or subcutaneously, but preferably into the internal vena spermatica (ovarian) into which an assistant meanwhile has inserted a cannula with a lumen of 3 to 5 mm. (the last vessel rather awkward to get into?). If possible this is not done until after active bleeding has been stopped.[20, 72] All of the cases with unfavorable symptoms recovered. The amount introduced varies from 500 to 1000 c.c. Doederlein does not agree with Opitz and Olshausen,[55] that free blood left in the peritoneal cavity is rapidly reabsorbed. Therefore, after removal of the blood to be used for reinfusion in ruptured ectopics he washes out the peritoneum with 20 to 30 liters of saline solution at body temperature. (It has been shown that 100 c.c. of defibrinated blood is absorbed from the abdominal cavity of a dog in 24 hours.[80a]) It is uniformly emphasized that fresh blood must be used for autotransfusion, and these are the cases, that most urgently need transfusion. But in cases of recurrent bleeding, where fresh blood and old hematomata are found, one can still employ this method. Some of the unfavorable reactions are due to decomposed blood. How long extravasated blood is usable depends on the vitality of the R. B. C. Their products of destruction may be of value in exciting formation of new blood. Lest the blood clot intravenously (a debatable question), the citrate is added or it is defibrinated. Hemolyzed blood is assumed by some not to be harmful.[7] Another advantage claimed more particularly in obstetrical cases is that the blood of autoinfusion brings back into the patient's body her own R. B. C. and serum, which at the end of gestation contain certain products that cause contractions of the uterus.[78] The rectal injection is more applicable in obstetrical cases because of the greater likelihood of contamination of the blood escaping from the uterus. Lichtenstein and Tuffier[79] emphasize that the value of autoinfusion of blood lies not only in the incorporation of a small amount of blood or a large number of R. B. C., but in reincorporating blood and living autogenous, nonhemolytic blood and serum and internal secretions. Placental blood given intravenously to criminals[79] has proved fatal because of the multiple emboli from placental villi, filtered out only partially by means of many layers of gauze. Rapid injection of placental blood killed animals, slow injection had no effect, another feature favoring

intramuscular or rectal injection in obstetrical cases. It is the equivalent of a nutritive rectal injection with favorable absorptive qualities, furthermore containing serum and hemoglobin.[79] One case absorbed 2000 c.c. from a total of 2250 c.c. (saline and blood) injected rectally. The intramuscular employment shortened convalescence perceptibly as the result of stimulation of blood building organs.[72] The quantity of reinfused blood was not material as shown by hemoglobin determinations.[72] Autoinfusion was successfully used in[20] (1) splenic rupture and hemorrhage by Von Peiser and Rauft; (2) liver rupture by Kreuter; (3) gun-shot wounds involving large intraabdominal vessels; (4) wound of the lung by Henschen; (5) ectopics; (6) such obstetrical complications as postpartum hemorrhage, placenta previa, etc. All of the cases fared well, and presumably would have died without this measure. Two or three exceptions are mentioned, notably by Opitz[55] and Albert.[2] The latter had a case which showed cyanosis, pain in the small of the back, hemoglobinuria, and icterus, i. e., all the earmarks of the reaction following transfusion with incompatible blood. This was perhaps due to the fact that the blood had disintegrated too far.

Some of the advantages claimed are: (1) absence of emboli (dependent entirely on the manner of filtration); (2) no hemolysis (which should not occur by using proper test for blood from another individual); (3) sufficient quantity of blood, available at once with no time lost in getting it, (although it will embarrass the operator, when a patient is in critical condition, to prolong the anesthesia in order to make the transfusion into a vein inside the abdomen; donors should be available, especially of Group 4, among the employees of the hospital); (4) testing and grouping not required (it is not as hard as one might infer); (5) there is no need for a Wassermann on the donor.

On the other hand: (1) the blood is not always sterile, even from the abdominal cavity[2] as the odor of colon bacillus sometimes betrays; (2) one never knows how long since the intraabdominal bleeding took place; old blood implies the danger of reaction and might not have any better nutritive value than plain glucose[25] per rectum, or gum-glucose solution intravenously; (3) large quantities of fluid blood are quickly absorbed from the abdominal cavity;[80a] (4) hemoglobinuria and icterus in a few cases are suggestive of hemolysis due to toxin of destruction products of already deteriorating blood; (5) too rapid an injection of blood is necessary if an intraabdominal vein be used and the anesthesia not be prolonged unduly; 1200 c.c. have been reinfused within 6 to 8 minutes in one instance,[43] which could predispose to acute cardiac dilatation; (6) on account of the pain caused by the subcutaneous injection it must necessarily be done under anesthesia. Except for the fact that one has the blood at his immediate disposal in these cases of acute hemorrhage Albert may be right in saying that the procedure has no especial advantages but brings dangers which we should not disregard; especially when the steps of an ordinary transfusion are so simple in competent hands combined with the removal of clots (leaving saline in the abdominal cavity) and the administration of glucose per rectum or intravenously. Furthermore we do not often see fatal ectopic gestations. The majority are doing well even without transfusion, although it is an excellent supplementary measure, because it shortens convalescence and, in cases of postpartum hemorrhage or placenta previa, lessens the tendency to sepsis, to which exsanguinated

eases are more susceptible. It is customary now to group placenta previa patients as soon as their condition is diagnosed.

In conclusion it cannot be too strongly emphasized that early transfusion, even at the risk of performing a seemingly needless operation, is far better than waiting until too late as is so often the case, when failure is inevitable. Prophylactic transfusion is becoming more and more employed on account of the harmlessness of it in competent hands.

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Selected Abstracts

The Newborn Infant

J. Whitridge Williams: Obstetrics and the General Practitioner. The Pennsylvania Medical Journal, 1921, xxiv, 290.

The author confines his essay to several simple topics which he has found from experience to be of great practical importance and yet most often neglected by those doing obstetrics.

Prenatal care concerns mother and child. One of its most important features is the routine and frequent examination of the urine for the detection of the early stages of toxemia and for the prevention of eclampsia by proper treatment. Eclampsia is the most serious of all conditions with which the trained obstetrician has to cope, and even in his hands the mortality is approximately 20 per cent. The disease is almost entirely preventable. Proper guarding against undue exertion in the last third of pregnancy will diminish the incidence of premature labor. The serious significance of any form of uterine bleeding during pregnancy should be impressed upon the patient. A thorough antepartum examination six to eight weeks before the expected onset of labor should be insisted upon.

Considering the child, the scope of prenatal care is immense. In this country 125,000 children die each year before they have completed four weeks of existence, and it is particularly with the prevention of such deaths that prenatal care has to deal. A critical study of 302 fetal deaths, occurring from the time of viability onward and including the two weeks immediately following delivery, showed that 72 per cent of the entire number were due to syphilis, dystocia, toxemia, and prematurity in the order named. Syphilis alone was responsible for 34.4 per cent. This however, does not include the syphilitic children discharged alive or those which developed congenital syphilis later. When syphilis has been determined as the cause of stillbirth, treatment should be instituted during the puerperium, so that the disease would be cured before the beginning of a new pregnancy.

Conscientious prenatal care could obviate the loss of at least one half of the children who now die during the first month following delivery.

Contracted pelves are far more frequent than was formerly thought, occurring in about 35 to 40 per cent of the colored women and in about 8 per cent of the white women. The important practical conclusion which the author has drawn from many years of study of contracted pelves, is, that 75 to 80 per cent give birth to their babies spontaneously.

The mortality rate from puerperal infection has been reduced to a small fraction of one per cent in hospital cases, while in private practice the mortality rate shows practically no change since pre-antiseptic days. About 45 per cent of all deaths occurring in childbed in this country are due to preventable disease. As a means toward avoiding puerperal infection, abdominal palpation and rectal examinations rather than vaginal examinations, are strongly advised. At least 80 per cent of all deliveries can be conducted satisfactorily by this means alone.

The dangers from the improper use of pituitrin are duly emphasized by the author. In his opinion its administration may be indicated when the cervix is fully dilated, the head on the pelvic floor, and only a few strong pains necessary to complete delivery, and occasionally in multiparae with deficient uterine contractions and the head still high in the pelvis, provided there is no disproportion and the cervix is fully dilated.

Postnatal care with especial reference to the discharge examination is urged. Such an examination occasionally reveals the existence of unexpected lesions, and enables the practitioner to tell his patient that some operative procedure will be required for its relief in the future, and thus obviates the reproach so often made when its necessity is discovered later.   NORMAN F. MILLER.

Ballantyne: Problems in Population and Parenthood. Edinburgh Medical Journal, 1921, xxvi, 55.

The report covers the conclusions and recommendations of the National Birth Rate Commission (41 members of both sexes) acting between 1916 and Nov. 21, 1919, and is grouped under five heads.

The first deals with recent alterations in the birth rate, largely due to the war. The legitimate birth rate in England and Wales fell from 23 per 1000 in 1913, to 16.6 in 1918, and in Scotland from 23.7 in 1913, to 18.6 in 1918. Ireland showed a decline from 22.2 to 19.1 in 1917. Illegitimate births in England and Wales while increasing slightly as a whole, rose from 4.3 per cent to 6.3 per cent of the total births. The total loss of births in England and Wales attributed to the war was estimated at 543,087. Differential fertility (almost negligible in the middle of the nineteenth century) was found to be much lower among the upper and middle classes than among the manual workers.

The second section contains the conclusions reached regarding the voluntary restriction of birth rate. Except therapeutically, no means should be used to terminate pregnancy when there is any possibility of pregnancy having taken place. Degenerates and defectives should not bear children. No contraceptive measures which could injure the health of potential parents or children should be used. Selfish reasons are not an excuse for childlessness. It is the duty of society to remove the

disabilities which are imposed upon worthy parenthood. Two reports were presented by fifteen members who, without religious or moral objection, discussed the dangers of contracepts. Eleven (5 physicians) considered them harmful both to health and happiness. Four (1 physician) thought the best contraceptive measures harmless. Endowment of motherhood and the care of unmarried mothers was endorsed.

Section three deals with infantile death. The conclusions were that the great loss of population before and immediately after birth is largely a problem in obstetrics so far as antenatal, intranatal, and neonatal deaths are concerned, and a problem of lactation and milk supply for deaths of infants occurring later. New and constructive means of dealing with these problems are needed.

The fourth section, "Contributary Causes of Loss of Population" is concerned with syphilis, gonorrhea and alcoholism. Syphilis causes 27,000 deaths annually in England and Wales, (20 per cent of the antenatal, intranatal and neonatal deaths). The Minister of Health was advised to call to the attention of the people the advantages of the use of prophylaxis or early treatment after promiscuous intercourse. Compulsory notification and treatment of venereal diseases is recommended.

Section five advocates education of the young for worthy parenthood including instruction in sex, hygiene and allied matters. The report is a document of immense importance and the minor differences of opinion are to be expected from the composition of the body. H. W. SHUTTER.

Glynn: Factors in Fetal Mortality. Pennsylvania Medical Journal, 1921, xxiv, 699.

The successful handling of obstetric cases requires more than the mere knowledge of obstetric and surgical procedures. It requires real obstetric judgment to determine the proper course for a happy outcome in the complicated labor. A thorough knowledge of the mechanics of labor and the general condition of the mother is necessary. One must be able to recognize early any pathologic condition and then carry out the particular treatment best suited to that case.

The chief faults in our present methods of the conduct of labor are the tendency to interfere too hastily and the excessive use of drugs, particularly morphine and pituitrin. Borderline cases of pelvic contraction should be measured internally before the onset of labor. In the treatment of eclampsia the author still agrees with Peterson in emptying the uterus after the first convulsion. Labor should be induced in pre-eclamptic states, grave toxemia of pregnancy, postmaturity and in the borderline pelvis. High forceps receive their just condemnation. For the case not in the hands of the expert, the author feels that Potter's method of version is preferable to the use of high forceps.

H. W. SHUTTER.

Schumann: Practical Aspects of Antenatal Hygiene. Pennsylvania Medical Journal, 1921, xxiv, 693.

The author divides antenatal hygiene into three distinct groups: First, the sociological factors of housing, food, sanitation and occupation as applied to the pregnant woman; second, the care of the woman from the standpoint of recognition, prevention and treatment of infec-

tion, toxemia and other disease present; third, the prevention of birth traumatism by careful estimation of the maternal pelvis, the size of the fetus, etc.; and the conduct of labor to the best interests of mother and child.

Since the state is dependent for its perpetuation upon the quality and number of its citizens, the problems of antenatal hygiene are the concern of the state. The physician's duty is to guide, counsel, and aid in awakening public sentiment. Positive eugenics is a biological error and a biologic impossibility. Tuberculosis, since it must be bred out, is not considered a contraindication to marriage.

In the practical application of prenatal care a thorough examination including the heart, lungs, thyroid and pelvis should be made as soon as pregnancy is suspected. The blood pressure, urine analysis, Wassermann (if indicated) and possibilities of dystocia should be noted. The blood pressure and urine analysis should be noted once a month until the seventh month, twice a month after. The activities of the mother are not curtailed. Syphilis is treated vigorously. A rise of 10 mm. in the systolic blood pressure should place one on his guard against possible toxemia.   H. W. Shutter.

Beck: **End-Results of Prenatal Care.** Journal American Medical Association, 1921, lxxvii, 457.

After setting forth the details of prenatal care as applied in the service of the Long Island College Hospital, Beck compares the results obtained in a series of 1000 consecutive cases receiving this care, with similar series receiving only prenatal nursing supervision and those receiving no prenatal care whatever. In 1000 cases receiving no prenatal care, there were 76 infantile deaths under two weeks; in those receiving merely nursing supervision, there were 47 such deaths; in the series receiving complete prenatal supervision, there were only 25 deaths.

It is interesting to note that for 106 cases of abnormal pelves, there were only 8 cesarean sections, 22 forceps applications and one craniotomy required in the series. There were only four maternal deaths, one due to pneumonia and three to puerperal sepsis, all occurring during the influenza epidemic. Seven patients had suppurative mastitis and in 59 the temperature exceeded 99° during the puerperium.

While few of the patients had troublesome emesis gravidarum and only four infants were lost due to toxemia, Beck's results in the prevention of abortion in general were discouraging.   R. E. Wobus.

Eden: **The Mortality of Premature Infants.** The Lancet, 1921, cci, 127.

The author briefly discusses the methods, old and new, of determining prematurity in newborn infants. He emphasizes the need of additional means of determining this factor.

With respect to premature infants he believes that the cases should be grouped; indicating (1) *mortality at birth*, including macerated fetuses, nonviable fetuses, and those which, though born alive, do not survive their birth; and (2) *mortality in infancy*. The former group is largely uncontrollable. Improvements in obstetric management, however, might enable a certain number to be saved, as in cases of toxemia,

antepartum hemorrhage, and syphilis. The second group, the one with which we are chiefly concerned, shows a gross mortality of 40 per cent. In other words, nearly half the premature babies born alive die before the end of the third week of life.

The percentage mortality of selected premature babies (which have no obvious disability in addition to their prematurity) may be anything from 35 to 50 times as great as that of mature babies born under the same or similar conditions.

Not much information is available as to the cause of this heavy mortality among the premature infants. Yet it is fairly safe to assume that the predominant factor in death from prematurity is malnutrition. The fatal susceptibility of premature infants to infections of all kinds must not be overlooked. Their tissues have not yet elaborated a defense against bacterial invasion and are, therefore, incapable of resistance.

The great importance of breast feeding for premature infants is emphasized. No doubt breast-fed babies do receive with the milk, immunity bodies, serviceable for defensive purposes.

NORMAN F. MILLER.

Ehrenfest: Intracranial Birth Trauma of the Newborn from the Standpoint of the Obstetrician. Journal American Medical Association, 1921, lxxvii, 103.

Intracranial birth injuries are produced by the mechanical exaggeration of the physiologic process of molding, resulting in excessive or sudden compression of the fetal skull; they are prone to occur in the course even of a normal labor if prematurity predisposes the infant to traumatic lesions; and they are necessarily aggravated by a hemorrhagic diathesis or by inappropriate manipulations during resuscitation. Upon these premises, Ehrenfest briefly bases the more or less obvious prophylactic and therapeutic measures to be employed by the obstetrician.

Forceps should be carefully applied with the minimum amount of compression. Extraction should be slow to permit gradual molding of the head. In breech cases, the head should remain flexed, strong pressure of the occiput against the symphysis is to be avoided as well as undue haste. Large doses of pituitary extract are dangerous. Episiotomy is preferable to extreme measures to protect the perineum. All brusque maneuvers must be avoided in resuscitation.

The diagnosis of intracranial lesions must be made early. In suspected cases the clotting time should be taken. Spinal puncture is a measure both of diagnostic and therapeutic value.   R. E. WOBUS.

Hereford: Birth Trauma. Southern Medical Journal, 1921, xiv, 542.

For the year of 1918 the mortality statistics for the registration area of the United States showed 6,149 deaths due to birth trauma.

Many infants surviving the immediate effects of birth trauma later develop into idiots, epileptics, feebleminded and insane. Some become deaf, dumb or blind.

The author believes intracranial hemorrhage to be of far more frequent occurrence than is generally supposed. The so-called hemorrhagic tendency of the newborn infants, or those dying within a short

time after birth, show hemorrhages in the dura, over the brain surfaces or in the ventricles. Some show hemorrhages in other organs of the body. The edema produced during difficult delivery may prove the more serious factor in some cases. Symptoms appear immediately after birth, or more commonly after two or three days.

The author believes lumbar puncture of the greatest diagnostic importance as well as excellent treatment. He advises daily repeated lumbar punctures withdrawing 10 to 12 c.c. of the bloody spinal fluid until the pressure of the fluid does not exceed 10 mm. In babies in whom the cerebral spinal fluid reaches a pressure of 15 mm. or higher, associated with other positive findings of increased intracranial pressure, a subtemporal decompression and drainage is advised.

NORMAN F. MILLER.

Greenwood: Artificial Respiration in the Newborn. British Medical Journal, April 23, 1921, No. 3147, p. 601.

The infant is held with the back of the neck on the palmar surface of the left hand, the occiput being supported between the thumb and the forefinger which grasps the mastoid. The ankles are held firmly from behind with the right hand. The child is held head upwards at an angle of about 15 degrees from the vertical. The child is allowed to move rapidly downward about two feet. It is now inverted, the head being downward. The infant is again moved smartly downward for a distance of about two feet. The movement of the abdominal viscera away from and toward the diaphragm stimulates cardiac and pulmonary action.

F. L. ADAIR.

Formichella: Amniotic Hernia Corrected by Operation. Journal American Medical Association, 1921, lxxvii, 465.

The case here reported is that of a full-term female child that was well developed and normal except for a hernia the size of a grapefruit protruding from an umbilical opening the size of a half dollar. It contained intestines which were plainly visible through the enveloping sheath of the cord. Under ether, an incision one inch in length was made above and below the umbilicus, the contents reduced, and the abdomen sewed up with catgut. The child made a good recovery.

R. E. WOBUS.

ERRATA

On page 408 of the October, 1921, issue of the journal, the "note" immediately under Fig. 1 in the article by Dr. Cary on "Sterility Studies—Simplified Methods in Diagnosis" should be deleted.

Issue of October, 1921, page 433: The name of Dr. W. J. Butler was inadvertently included as co-author with Dr. Reuben Peterson of the paper on Pneumoperitoneum and Roentgenography as Aids to More Accurate Obstetric and Gynecologic Diagnosis. Dr. Reuben Peterson of Ann Arbor, Mich., was the sole author of the paper.

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Society Transactions

Department of Reviews and Abstracts

Item

Original Communications

VULVAL AND VAGINAL CANCER TREATED BY FILTERED AND UNFILTERED RADIUM EMANATION*

By Harold Bailey, M.D., and Halsey J. Bagg, Ph.D., New York, N. Y.

THE treatment of cancer by radium emanation, enclosed in minute glass tubes and implanted directly into the growth without any further filtration, was first suggested by Duane in 1908. Joly and Stevenson (1914) used this method and reported a series of cases so treated. H. H. Janeway standardized this procedure, using it in many types of cancer in various parts of the body. He also first made use of buried emanation as a prophylactic agent, following the dissection of lymphatic structures at a distance from the lesion. In tongue and mouth cancer, after treating the original ulcer, his procedure was to dissect the lymph glands of the neck and then imbed a number of unfiltered radium tubes. In 1919, he reported a series of five cases of vulval carcinoma treated by the implantation of unfiltered tubes, reinforced by filtered radium, held by dental compound on the surface of the growth.

When this method was first employed, the tubes varied from 2 to 5 millicuries in strength, and in a number of instances there was considerable sloughing and irritation of the treated areas. Bagg, investigating the action of various doses of radium on living tissues, when implanted in this manner, found that the amount of tissue affected was not exponential to the size of the dose, and that as a matter of fact, with doses from 1 to 4 mc. there was but slight increase in this area when the dose

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*Read at the Forty-sixth Annual Meeting of the American Gynecological Society, Swampscott, Mass., June 2-4, 1921.

Note: The Editor accepts no responsibility for the views and statements of authors as published in their ''Original Communications.''

The papers included in the Transactions of the American Gynecological Society are printed in the order of their presentation.

was increased by 100 per cent. However, the larger dose leads to a more intense necrosis in the tissue immediately adjoining the tube.

METHODS AND APPARATUS

1. *Filtered Radium.*—The filtered radium is applied according to the location of the lesion by one of three methods. These methods are described in detail in previous publications and they consist in the so-called ''bomb,'' ''block,'' and ''dental compound'' applicators.

In brief the ''block'' technic involves the use of 1000 to 2000 millicuries of radium emanation, filtered by either 2 mm. of brass or 2 mm. of lead, and ½ mm. of silver, and held from the skin by 4 cm. of wood. In the first part of our work, lead was used as a filter and the dosage was 3000
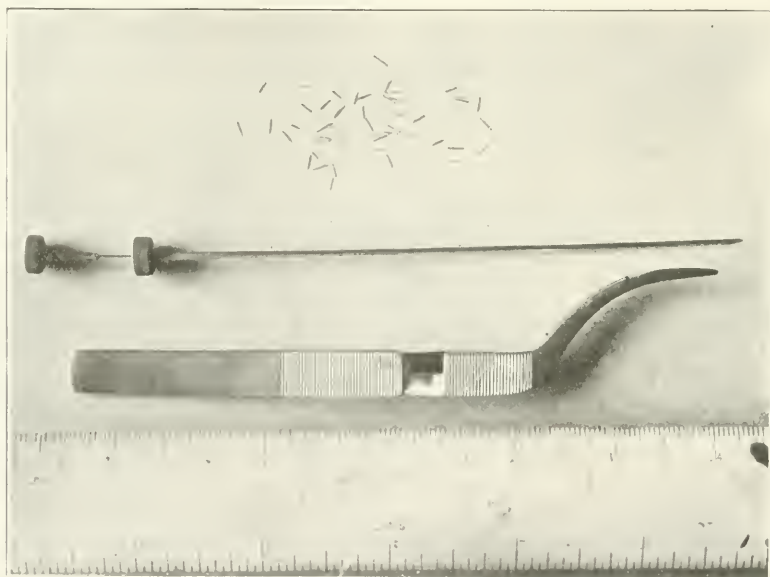
Fig. 1.—Bare tubes of radium emanation filtered only with 0.3 mm. of glass. Trocar and forceps; scale placed below shows the size of these instruments.

mc. hrs. Following the research of our Physical Department, it was found that such heavy filtration was unnecessary, and an equivalent dosage was determined with a brass filter which has resulted in a material saving of the available radium. The ''block'' is applied for radiating the local lesion and both inguinal regions in vulvar cancer, and is used in six applications around the pelvic girdle in vaginal cancer.

In using filtered radium applicators for external lesions we follow the method devised by Dr. Janeway, which consists in using a 1 mm. platinum capsule held in position by dental compound. The dose is usually 350 mc. hrs., the applicator being placed on the surface of the lesion. This method was also employed in treating lesions of the anterior vaginal wall.

The ''bomb'' was used only for the vaginal lesions. One thousand

millicuries of radium emanation, with a filter of 1 mm. of platinum, was used for one hour directly over the growth. This applicator is so constructed that side radiation is minimized, and the rectum and bladder are protected by a heavy filtration of lead.

2. *Unfiltered Radium.*—The unfiltered radium is inserted into malignant growths by means of long steel trocars. The small glass tubes consisting of radium emanations are placed at the pointed end of the instrument, which is then thrust into the tissue and the trocar is slightly withdrawn, as the tubes are deposited by exerting pressure on the stylet.
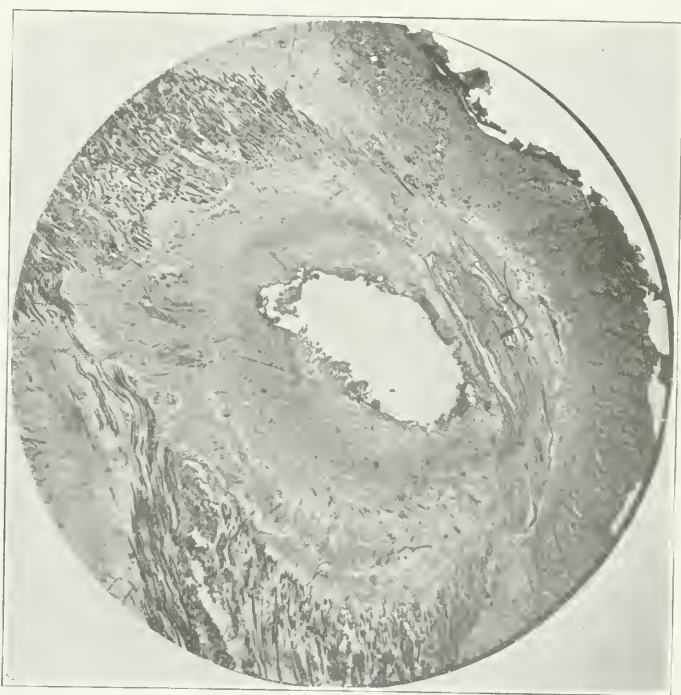
Fig. 2.—A bare tube containing 1.4 mc. of radium emanation was kept under the skin of a normal rat for 17 days. The open area in the center shows the location of the tube; around this area is a zone of complete necrosis and this in turn is surrounded by a zone of marked edema. The tissues show typical degeneration due to radiation. The area of destructive reaction is 1 cm. in diameter.

EXPERIMENTAL RESULTS FOLLOWING THE IMBEDDING OF UNFILTERED RADIUM

The histologic structure of the tissue about the radium tubes implanted in animals is shown in Figs. 2 and 3. Fig. 2 shows the tissue reaction from a small tube containing emanation and left under the skin of an animal for seventeen days. The central excavated area was in the immediate proximity of the tube, about this was an additional zone showing marked edema, some exudate, and less severe degeneration extending over a total area of 1 sq. cm. Fig. 3 was selected to show the marked leucocytic infiltration that is associated with the insertion of small doses of imbedded unfiltered emanation. The specimen was taken from

the edge of a lesion experimentally produced in the brain of a living animal. At the right of the illustration is shown a portion of the central area of necrosis, surrounded by a sharply demarked zone of polynuclear leucocytes beyond which there is a wide area of hyperemia, and some edema of the pia. The ganglion cells near the necrotic zone showed marked hydropic degeneration and all the nuclei stained poorly.

Figs. 4 and 5 show the reaction to imbedded radium in tumor in the human subject. Fig. 4 shows a myosarcoma of the vulva before treatment. Fig. 5 was from a specimen taken one week after imbedding of small doses of unfiltered radium. The histologic changes show typical
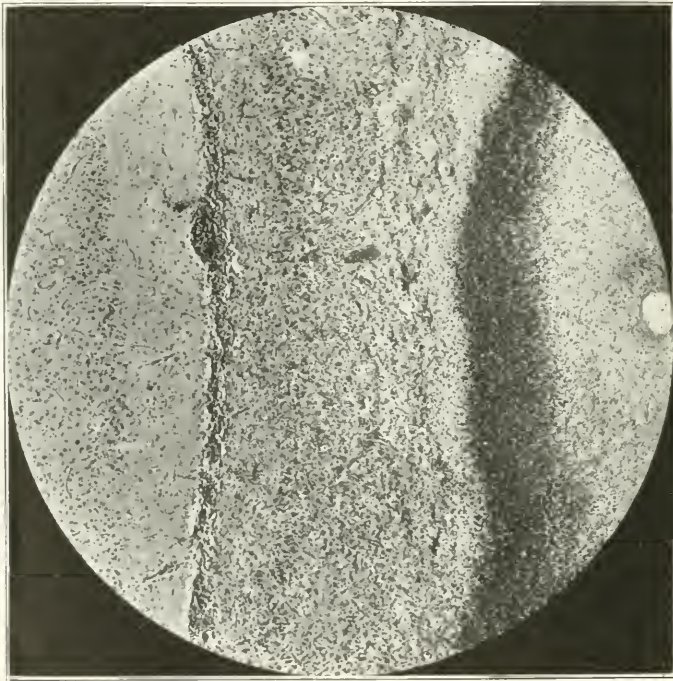
Fig. 3.—One and two-tenths mc. of emanation placed between the scalp and calvarium of a rat for 30 days. This is a highly magnified picture showing the periphery of the lesion produced in the brain. At the extreme right is an area of complete necrosis. The broad dark zone shows a dense leucocytic infiltration. In the middle of the photograph is a broad zone of hyperemia, sharply marked off from the area on the left where there is normal brain tissue.

radium effects. There is an increase in size of the cells with hyperchromatism and swelling of the nuclei and pronounced hydropic degeneration.

The localized reaction of the buried radium emanation is probably due to three reacting factors; first, the dispersion of the rays is increased the greater the distance from the source, so that the more distant gamma ray effect is comparatively slight and less sharply defined than the more intense beta ray reaction immediately surrounding the tube. Second, as shown by the recent work of Quimby, the beta rays are largely absorbed

by a few mm. of tissue; and third, the inflammatory reaction set up in the tissues in response to the radiation tends to localize the reaction. When strong tubes are used the area of tissue immediately surrounding the source of radiation is radiated for a longer time than is necessary to produce the death of the cells, and we believe that in most cases this is undesirable.

CANCER OF THE VULVA

There have been 10 cases where the labia were involved, the lesion varying from round flat growths, 2 cm. in diameter to larger masses
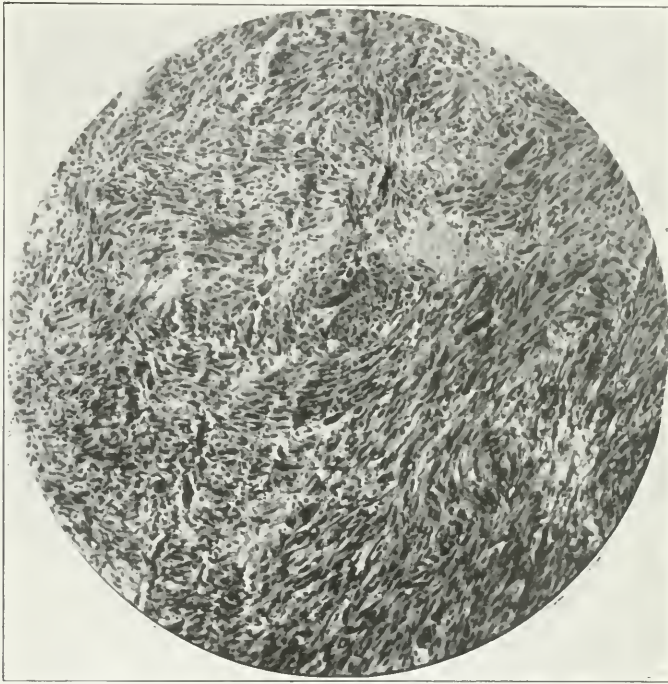
Fig. 4.—Sarcoma of the vulva. Cells showing mitosis and signs of active proliferation. Selected because in this case we were able to obtain a follow-up picture at the end of ten days.

1½ cm. thick and 7 cm. in the longest diameter. In most instances the lymph glands were affected. The pathological reports showed squamous cell carcinoma, with one exception, a myosarcoma. One of the cases developed a vulval tumor two years after she had appeared in the clinic for treatment for a recurrent cancer in the vaginal vault following a hysterectomy. Although only short periods have elapsed since the treatments, there are several of the cases that have shown marked improvement and this fact has encouraged us to continue this technic.

Outline of Treatment of Vulval Cancer.—1. Radiating the primary lesion with filtered radium. 2. Radiating the groin on both sides with filtered radium. 3. Imbedding unfiltered tubes of 0.5 millicuries each.

in the primary growth, placed $\frac{3}{4}$ of a centimeter apart. 4. Dissection of the groin, when necessary, with further radiation by means of buried emanation.

In our first enthusiasm with the method of imbedding many bare tubes of weak strength, we saw such regular and prompt retrogression of the ulcer that it seemed unnecessary to treat the lesion further. However, the marked and early involvement of the glands caused us to turn again to the primary ulcer. This was then treated with filtered radium, but recently the procedure has been reversed and the filtered radium is used first to avoid the possibility of spreading the disease by trauma at the time of the implantation of the tubes.
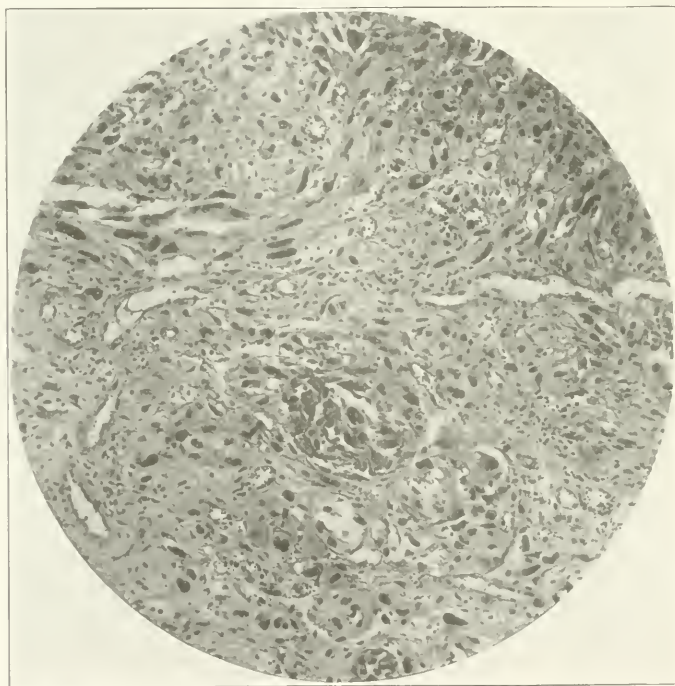
Fig. 5.—Same tumor as Fig. 4 but following radiation. Enlargement and pyknosis of the nuclei, loss of mitotic figures, vacuolation and leucocytic infiltration.

Treatment of the Ulcer.—In inserting the glass tubes, of approximately 0.5 millicuries value, the tumor is theoretically marked off into square centimeters, and 1 tube is placed in each area. In larger lesions, 5 to 7 cm. in diameter, it is well to implant the tubes along the edge of the growth at about $\frac{3}{4}$ of a centimeter distance, and leaving the needles in place, implant the remainder in parallel lines from the edges. The needle carrier is inserted as near as possible to the base of the ulcer; and before the radium is discharged, it is withdrawn slightly as the stylet deposits the bare tube.

All the cases should be seen after three weeks, and then it will be

evident what areas, if any, have been untreated or ineffectively radiated. We find that a second treatment is usually necessary.

Treatment of the Lymph Nodes.—Although external radiation is usually considered as but feebly affecting glandular metastasis, we have relied upon it to the extent of first treating the groins with a dose of 3000 mc. hrs., at a distance of 4 cm., with the lead ''block'' or with 2000 mc. hrs. with the brass ''block.'' After a period of six weeks, or two months, if there is palpable involvement, the glandular areas are dissected on one or both sides. If the lesion is in the upper part of the vulva, the glands of both sides may be involved.

Fig. 6.—Carcinoma of the vulva. The tumor mass is divided into square centimeters and a tube is inserted into each.

We have been satisfied with simple dissection of the inguinal chain with sometimes an additional incision over the femoral area. On removal of the glands, unfiltered tubes of 0.3 to 0.5 mc. each are laid 1 cm. apart, and if possible, also into the stump of the lymphatic chain. Bare tubes* have been laid in glandular masses entering the femoral ring, and also in glands above Poupart's ligament. If the radium is not laid directly against the vessel, or into its lumen, tubes of 0.3 mc. apparently do not lead to erosion. There have been no secondary hemorrhages in

*Bare tubes refer to radium emanation filtered by only 0.3 mm. of glass.

this location and none within two months of such insertion directly through the vaginal vault. We have had but two primary hemorrhages in the pelvis from direct injury by the needle during the insertion, but these have fortunately been readily controlled.

Where the glandular metastasis has extended into the pelvis rather than to do such a radical dissection as in Basset's operation, we have relied upon the surface application of filtered radium for palliative purposes. There have been some cases that have required a second dissection of this region. As in surgery, the primary lesion is easily taken care of, but the lymph glands bring final disaster in many of the cases.

Of the six cases of this group that are still living the following are selected for purposes of showing the actual experiences with the technic.

1. *Vulval carcinoma, with lymph gland involvement, resulting in a complete retrogression of the original ulcer, and with the glandular areas held in check.* No. 27088. Age thirty-nine. Microscopic examination of specimen showed epidermoid carcinoma. Hysterectomy in October, 1918. Vulval lesion noted the following June. Examination: Lesion of the vulva extending from the urethra two-thirds of the way to the fourchette. The inguinal glands on the left side are enlarged. Treatment: December 1, 1919, the lead block at 4 cm. distance for 2998 mc. hrs. Two days later, 7 bare tubes of 1 mc. each were imbedded in the vulval growth, giving a dose of 924 mc. hrs. February 24, 1920, 817 mc. hrs. were applied to the lesion by means of a 1 mm. platinum tube held in dental compound. One month later, the left groin was dissected and enlarged glands removed. Bare tubes of 0.5 mc. each were distributed throughout the wound, giving a total dosage of 462 mc. hrs. June 14, 1920, the right groin received a dosage of 2946 mc. hrs. by means of the lead block. December 29, 1920, there was no evidence of disease in the vulva and the glands showed no recurrence. May, 1921, the vulva showed no signs of cancer. There is a thick ridge of tissue in the groin.*

2. *Early primary cancer of the vulva, without palpable glandular involvement.* No. 27979. Age seventy-two. Microscopic examination showed squamous carcinoma. Growth preceded by itching of labia for a number of months. One year ago, a pea-sized lesion was noted in the vulva. Examination: There is a growth in the left labia minora, 2 by 3 cm. Irregular, hard, and with induration extending to the vaginal orifice. There is no palpable glandular involvement. Treatment: August 10, 1920, 26 bare tubes, totaling 5.7 mc. were imbedded in the lesion, giving a dosage of 752 mc. hrs. This treatment was repeated with a dose of 887 mc. hrs. on November 1, 1920. Five days later, the groins were treated with a dose of 2599 mc. hrs. by means of the lead block. At present, there is a small area of cancer tissue at the site of the primary lesion.

3. *Primary cancer of the urethra, with glandular involvement and with a retrogression in both areas, followed by late recurrence at the original site of the lesion.* No. 27016. Age thirty-one. Microscopic examination showed epidermoid carcinoma. A growth was noted four months before admission to the hospital. The lesion was not painful, but bled easily. Examination: The entire urethra on its lower walls is infiltrated by an ulcerating growth. The mouth of the urethra is split open and forms an ulcer of 1 cm. in diameter. There is glandular involvement of both groins. Treatment: November 10, 1919, both inguinal regions were treated with 2913 mc. hrs. by the lead block. The following week, 8 bare tubes of 0.6 mc. each, giving

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*At the time of reading this proof (November, 1921), six months after the paper was written, we found a recurrence in the right parametrium.

a total of 1056 mc. hrs., were placed in the local lesion. On January 5, 1920, 8 tubes were again imbedded in the lesion for a total of 243 mc. hrs. The tubes were 0.2 mc. each. May 10, 1920, two bare tubes, of 0.4 mc. strength, were placed in hard nodules beneath the urethra. On August 23, 1920, 10 tubes, of a total strength of 2.0 mc., and 2 of a total of 0.9 mc., were placed in the lesion around the external urethral meatus. At the same time 7 tubes of a total of 3.0 mc. were placed in the right groin after dissection, giving a total dose of 397 mc. hrs., and 6 tubes of a total of 2.6 mc. strength (340 mc. hrs.) were imbedded in the groin on the left side. Microscopic examination of the lymph nodes showed epidermoid carcinoma. In May, 1921, there was a recurrence of the tumor at the original site. Twenty bare tubes, averaging 0.45 mc. in strength, were placed in the lesion. the dose was 1212 mc. hrs. At the same time, a dose of 376 mc. hrs., in a 1 mm. platinum capsule, was held on the surface of the lesion by dental compound. At present there is a radium slough over the radiated area.

In this case, we depended entirely upon the use of unfiltered radium in the treatment of the primary lesion. We now feel that in all cases the ulcers should be first radiated by filtered radium with a sufficient dose to affect outlying areas beyond the reach of the bare tubes implanted in the ulcer. The second point to be gained from the history of this case is the necessity of frequent observation even though the patient may seem to be cured.

CANCER OF THE VAGINA

Outline of Treatment.—1. Imbedding of unfiltered tubes of 0.5 mc. each, in the primary growth and placed about ¾ of a centimeter apart.

2. Filtered radium in the "bomb" applicator directed toward the growth.

3. Six external applications of filtered radium by means of the "block," reinforcing the radiation in the parametrium.

The two following cases are selected as typical of the lesions occurring in this location.

1. *Primary carcinoma of the vagina with no parametrial involvement, showing complete retrogression.* No. 26990. Age fifty-two. Specimen showed papillary epidermoid carcinoma. Examination: There is an annular growth, 3 cm. in diameter, on the posterior wall of the vagina, with the limits sharply defined.

Treatment: October 29, 1919, 6 bare tubes with a total dosage of 6.6 mc. and a value of 814 mc. hrs., were implanted in the tumor. One month later this was reinforced by 1040 mc. hrs. by means of the "bomb" applicator. February 11, 1921, there was a slight thickening in the posterior vaginal wall. May, 1921, there is no evidence of disease, and the vaginal wall is elastic.

2. *Primary cancer of the vagina, with parametrial involvement, and complete retrogression.* No. 27245. Age forty-one. Specimen showed squamous carcinoma. Examination revealed a primary growth on the posterior vaginal wall, 4 by 5 by 1 cm. in diameter, extending to the vault, but not involving the cervix. The rectal wall was free, but the right parametrium was thickened.

Treatment: January 16, 1920, 17 bare tubes, of a total of 5.9 mc., and a value of 779 mc. hrs., were imbedded in the growth. An external treatment over six places about the pelvic girdle, with a dosage of 2850 mc. hrs., was given by the lead block. Three days later, 1050 mc. hrs. were given by the "bomb" method, with the

apparatus directed toward the lesion. Examination shows a slight bridge of tissue crossing beneath the mucous membrane. There was no evidence of cancer.

There were 18 cases treated by this method, and of these, 5 are alive and 4 are apparently free of the disease, although only short periods of time (the longest is 2 years) have elapsed since the treatment. All the growths were primary with two exceptions. These had recurrences in the lower, or first portion of the vagina, following hysterectomy for cancer of the uterus.

If the growth is localized on the posterior wall, a finger in the rectum aids in fixing the indurated area and facilitates the placing of the tubes. If the growth is on the anterior wall, one or two needles are inserted into the center of the growth, about $3/4$ cm. apart, and after discharging the emanation tubes, they are left in the growth and the shank of the needle is grasped, thus holding the entire area in position, while the remainder of the tubes are inserted. In the lower third of the vagina, the bare tubes are reinforced by means of radium in platinum tubes, held in place by dental compound. In the upper and middle thirds, the filtered radium is given by means of the "bomb."

With but one exception, there have been no glandular enlargements of the inguinal region in the cases where only the vagina was involved by the primary growth. All the lesions were of the ulcerative type and were accompanied by underlying induration, which in a few cases extended into the parametrium and could be readily palpated through the rectum.

DISCUSSION OF RESULTS

Until Janeway had instituted the use of imbedded emanation in vulval cancer, the general opinion of gynecologists was that radium had no place in this field, and even recently we have seen a statement to this effect. From a study of the subject extending now for more than three years we must disagree with this opinion, for we know that the original lesion may be completely eliminated without loss of any considerable amount of normal tissue and with comparatively little pain.

We believe that the method outlined is an ideal one for destroying the primary lesion. There is a minimum opportunity for spreading the disease, especially if the insertion of the tubes is preceded by an application of heavily filtered radium, which tends to devitalize the tumor cells. Wherever possible, the radium tubes surrounding the lesion are inserted through normal tissue. It might seem at first thought that the cautery could accomplish as much and in a shorter time. It must be remembered, however, that the two reactions are dissimilar. The imbedded radium produces a prolonged, gradual, reactive inflammation which is effective in checking the extension of the disease.

The experience with various doses of imbedded unfiltered radium emanation has shown that if the tubes are of 5 mc. strength, the elimination

of the tumor is associated with extensive sloughing and prolonged and serious discomfort; whereas the smaller dose of about 0.5 mc., accomplishes as much for the removal of the growth, and yet without sloughing and with little pain. Except in the most minute lesion, it is not possible to arrange the placing of the tubes so that all the cancer cells are effectively radiated. Filtered radium to further check the growth of the injured, or partly damaged cells, is necessary as an adjunct to the implantation of bare tubes in vulval and vaginal cancers.

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MEMORIAL HOSPITAL.

TORSION OF THE CECUM WITH REVIEW OF THE LITERATURE AND REPORT OF A CASE*

BY SIDNEY A. CHALFANT, PITTSBURGH, PA.

AN abnormal mobility of the cecum and ascending colon is a prerequisite to the development of a volvulus in that part of the intestinal canal. This abnormal mobility has been thoroughly studied by Harvey,[1] who reports his findings in 105 autopsies in infants between birth and two years of age, and gives a most thorough review of the literature. He found an abnormal mobility of the cecum and lower two-thirds of the ascending colon in 13.3 per cent of his cases. This seems to be a rather low percentage as the same writer quotes others ranging from 14 per cent (Piersol[2]) to 26 per cent (Treves[3]) and 31 per cent (Smith[4]). This abnormal mobility of the large intestine including also the descending colon is normal in the pronograde animals as pointed out by Morley,[5] who states, "that the fixation of the colon progresses, *pari passu*, with the adoption of the erect posture, until in an orthograde animal such as the chimpanzee, the fixation differs in no material degree from that in the normal human type."

The fusion of the peritoneal surface occurs in the later months of intrauterine life or in the first few months after birth. Connell[6] suggests that the failure of fusion may be due to a late rotation of the first part of the large intestine in which coils of the ileum prevented the apposition of the surfaces that usually fuse.

While a marked mobility is present in about 20 per cent of persons of all ages, in only 1 per cent, according to Wandel,[7] does this extend up to or beyond the hepatic flexure.

Bundschuh in 1913[8] reviewed the literature and found 110 cases including one of his own. Kohler[9] reported an additional case, Corner and Sargent[10] five, Satterlee[11] one and Morley[12] one, making a total of 118 and with ours, 119 cases that we have been able to find to date. Of these 119 cases, 23 were not operated upon and all died; of the 96 cases operated upon, 57, or 59 per cent, died, giving a total mortality of 80 out of 119, or 67 per cent.

Torsion may occur in one or two ways; first rotation on an intestinal axis in which the cecum is carried across the abdomen and lies in the splenic area, kinking the colon at the hepatic flexure; or second, rotation on a mesenterial axis in which the cecum, ascending colon, and more or less of the terminal ileum are rotated at the hepatic flexure. This was the nature of the torsion present in our case.

The symptoms of torsion of the cecum are apparently less violent than those of torsion of the sigmoid. They depend upon several factors, especially the amount of small intestine involved, the degree of the torsion, and the lapse of time before operation. In those in which the entire small intestine is involved, occurring usually in infants, the symptoms are severe abdominal pain, general meteorism, and collapse. Death occurs in from six to twelve hours from shock and hemorrhage into the paralyzed bowel, commonly without a diagnosis having been made.

In the more chronic cases there is, as a rule, a history of attacks of sudden pain in the upper abdomen, vomiting and constipation. These attacks occur more or less frequently over a period of years. The symptoms appear to be due to a partial torsion that corrects itself spontaneously. Finally, a more complete torsion takes place which, if not operated upon, is fatal.

In the early cases without damage to the intestine, simple detorsion, with fixation of the cecum and ascending colon to prevent a recurrence, is sufficient. In the later cases the same principles apply as in intestinal obstruction in general, relief of the obstruction, care for the damaged intestine and drainage of the bowel above the point of obstruction.

CASE REPORT

Mrs. M. W., age forty-nine, was seen August 3, 1919. Family history negative, except that her mother has carcinoma of the bladder at the present time. Patient had the usual diseases of childhood. There has been for many years a marked constipation, but no history of attacks of pain. Fifteen years ago she was operated upon by Dr. F. F. Simpson and the left side of a double uterus with the corresponding tube and ovary was removed. Her convalescence was normal. Puberty at thirteen; periods irregular until twenty-four years of age; since then they have been regular, of the 28-day type, lasting four to five days. Eighteen months ago she had a profuse and prolonged menstrual flow which amounted to quite a severe menorrhagia. Since then she has been bleeding irregularly and at times profusely. There has been no marked loss in weight and no bleeding from the bowel.

The patient's present illness began one week ago when, after eating a heavy meal, she had an attack of severe pain in the upper abdomen. This pain recurred

frequently and for the past four days has been almost constant, but of varying severity, and has been confined to the epigastrium and right hypochondrium. For the first three days the bowels moved with the aid of laxatives and enemata, but for four days she has passed no fecal matter or gas. Four days ago she vomited for the first time and has vomited three times since, but never at any time anything suggesting fecal matter.

Examination showed heart and lungs negative. Pulse 80, and temperature 99.8° F. Abdomen markedly distended and peristalsis visible. There was no rigidity, but marked tenderness in the epigastrium and right hypochondrium. There was no evidence of hernia.

Vaginal examination showed the uterus enlarged to about twice its normal size and adherent to the right pelvic wall. There was some bleeding on examination. Nothing further could be determined on account of the distention of the abdomen.

This was thought to be a case of intestinal obstruction of a subacute type, low in the intestinal canal on account of the moderate symptoms, and vomiting coming on rather late in the course of the disease. As the history of uterine bleeding for eighteen months and the presence of a large adherent uterus suggested strongly a late carcinoma of the fundus, it was considered that the obstruction was probably due to an adhesion of the rectum or lower sigmoid to the uterus, kinking it, or possibly to an extension of the growth to the intestinal wall constricting the lumen. An obstruction due to a band of adhesion following her former operation was also thought to be a possible diagnosis.

The patient was sent to the hospital for immediate operation. On account of the apparent nature of the obstruction and the length of time since the onset of the trouble, a high left colostomy was decided upon. On opening the abdomen just above the left anterior superior spine of the ilium the descending colon was found collapsed. Through this incision a greatly distended loop, apparently of the large bowel, could be felt on the right side, extending to or a little beyond the midline. A right rectus incision was then made and this distended loop of intestine, which proved to be the cecum, ascending colon and about eighteen inches of the terminal ileum was delivered. The obstruction was just below the hepatic flexure and was due to a rotation of 360° from right to left, of the large bowel with the involvement of about eighteen inches of the terminal ileum, and was complicated by a firm band of omentum which surrounded the intestine at the point of constriction. The omentum was divided and the torsion corrected. The pressure within the cecum was so great that the peritoneal coat along the longitudinal bands separated when the cecum was delivered from the abdomen. The pressure at once was greatly reduced and the color returned to the intestinal wall. After repairing the peritoneal coat of the cecum, the intestines were replaced and the abdomen closed hurriedly without drainage. No attempt was made to fix the cecum. Convalescence was complicated by an infection in the rectus incision and an attack of digestive disturbance at the end of two weeks, associated with pain in the upper abdomen, diarrhea, and slight elevation of temperature.

Since leaving the hospital the patient had several attacks of pain in the upper abdomen resembling, according to her family physician, gallstone colic. There was no uterine bleeding until two months ago. For three weeks it was quite profuse, and the patient was readmitted to the hospital. She had a moderate elevation of temperature and pain in the lower abdomen. After the temperature subsided we attempted to do a diagnostic curettage, but on dilating the cervix about three or four ounces of pus escaped. She has just recently been discharged in good condition.

This case is reported in order to point out the fact that torsion of the cecum, while a rare condition, does occur, and that it must be considered

in making a diagnosis in obscure cases of intestinal obstruction. This is especially the case in patients presenting a history of obstinate constipation with previous attacks of severe pain in the upper abdomen.

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ENDOCERVICITIS AND EVERSION AND THE NASAL CAUTERY TIP*

By Robert L. Dickinson, M.D., New York, N. Y.

THE present evidence of discontent with some of the end-results of our cervix surgery calls for a more careful adaptation of the particular operative measure to the particular cervix. It calls also for a consideration of the injuries and inflammations that can be rendered harmless and symptomless by treatment outside the operating room, and particularly for a reappraisement of measures other than operative.

One such measure is too little employed,—the delicate cautery used in the nose. It has a not inconsiderable field between the simple raw areas and catarrhs that respond to a couple of applications, and the major injuries that need hospital work. Even among the latter there are some cases so benefited by preliminary treatment that their surgery is simplified. In a number of instances where the patient has been obliged to postpone operation for a major condition of the cervix, and this palliative treatment was used to relieve symptoms, I found operation in the end unneeded because the healing was enduring and the inroll sufficient. Furthermore, any measure that will abbreviate office treatment and obviate the pelvic obsession of the chronic office habitué is to be welcomed.

As technic, this method is not to be classed with the clumsy Paquelin hospital operation of Hunner except in its effectiveness in proper cases. Therein it is all that Hunner claims.

The cases responding particularly to this treatment happen to be especially rebellious to others. The worse they are, the more they are adapted to the hot wire. These are:

1. Rough and extensive granulation, with eversion.

2. The cysts, superficial or deep (these recur sometimes after repairs).

3. Voluminous, adhesive mucous catarrh of the canal.

4. Gonorrheal free secretions, with thickened lining.

5. Between-birth erosion with laceration (recurring with each labor if sewed in the interim).

6. Patients whose physical condition precludes, or whose circumstances postpone, operation.

7. Marked endocervicitis in virgins (because the visits are few).
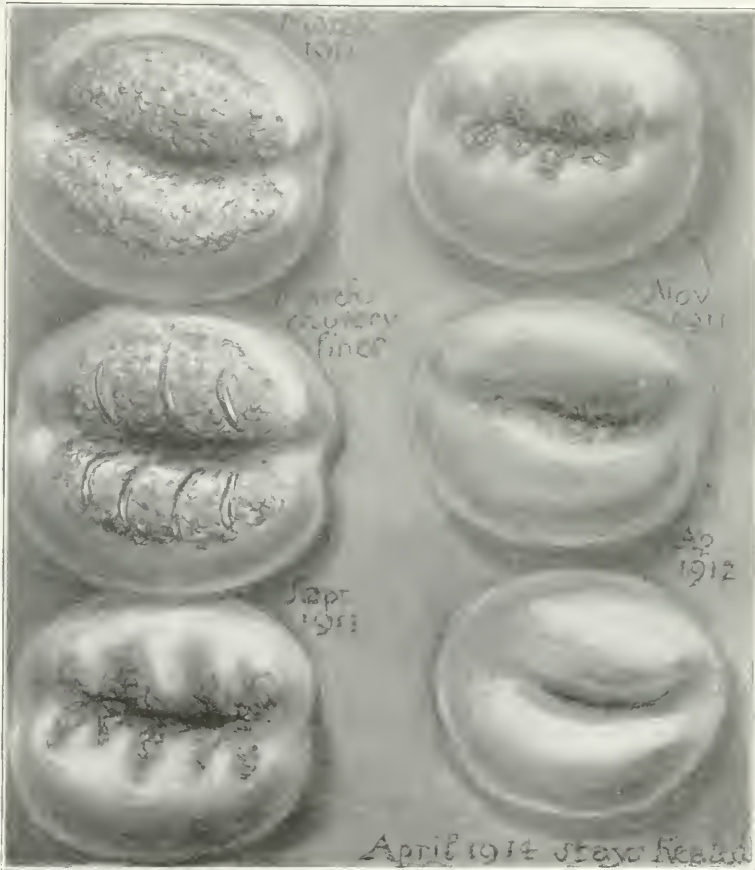
Fig. 1.—Laceration with eversion and granular surface, life-size. Cautery lines at first treatment. Absent for six months—demonstrating possibilities from single application. November shows effect of second treatment. A third in April gave the permanent healing, and shrinkage and inroll seen in lower drawing, so that operation was not required.

There are groups that belong to other methods, such as: those responding promptly to simpler measures, or very sensitive; catarrh with pinhole external os, that calls for dilation; chronic infiltration about the internal os, requiring the dilator; edema, and edema simulating hypertrophy, that need depletion; congestions due to constipation and sex-

function disturbance; and endocervicitis that is an expression of a general condition.

The type of outfit is of some importance. The finer the electrode, the better. The generator with the vicious spitting noise alarms patients. The hum of the ordinary motor is feared. It may and should be obliterated by hanging the motor in another room, or a closet, or, better, in the cellar.
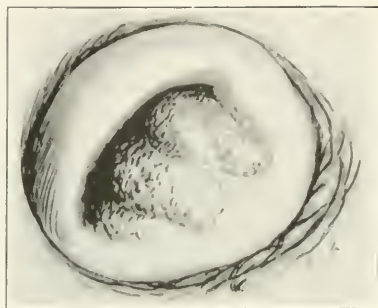
Fig. 2.—Chronic endocervicitis of intact virgin, with hypertrophy and eversion and granular surfaces. Shrunken and inrolled by single thorough treatment in office, using tiny Sim's speculum. (Life-size.)

On granular areas a tiny deep gutter is swiftly burned at $\frac{1}{4}$ inch intervals. For small areas punctures are made. Repetition once in 10 or 14 days is the average, two or three treatments sufficing. Progressive scar shortening does the inrolling later. Why the untreated intermediate strips should heal I do not know. For erosion with edema, shrinkage with

Fig. 3.—Aggravated catarrh of canal with distention and thickened lining. Reduced below life size, yet demonstrating the large amount of retained, inspissated mucus. The canal is cleared and the fine tip lays a stripe on opposite sides of the passage.

boroglyceride can precede cautery. Sticky secretion must be cleared away before the cautery is used. Narrow rough gauze twisted in the canal does this best, such as the discarded cut-off edges of gauze squares, or inch bandage. The wide gonorrheal canal is treated with two stripes, the narrow by punctures.

As a temporary measure till childbearing is done with we find no in-

frequent need of this particular treatment. Aching and dysmenorrhea and erosion, one or all, may oblige us to consider repair, even though the condition is likely to be reproduced by the next delivery. Here is the substitute. Of course in the presence of a torn sphincter poorly united or a cystocele or a retroversion with symptoms and which no pessary will hold, cervix work would accompany other surgery. Or, if extreme, cervix damage is supposed to cause sterility. The point is that easy labor is favored by the open cervix and that our suture scar tissue may hinder dilation in labor,—even with some of our best results.

Obstinate adhesive catarrh behind a somewhat narrowed external os we had been in the habit of treating by stretching the opening and using
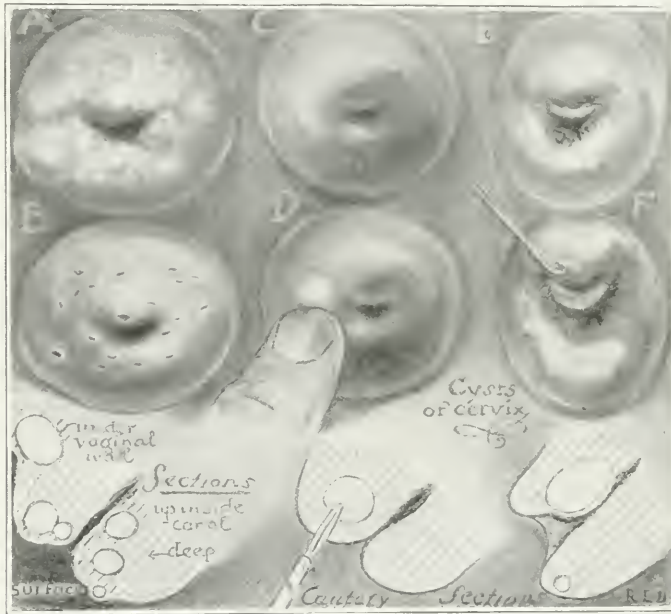
Fig. 4.—Cysts of cervix (reduced below life-size, as shown by size of finger). *A*, multiple cysts in various locations. *B*, Gaping openings left a few days after cautery puncture. *C*, Cervix without visible evidence of cyst, yet presenting to the finger the characteristic feel. *D*, the finger makes pressure and blanches the surface over the cyst, and the wire cautery tip at once stabs this spot, as the section shows. *E*, Cyst deep in canal. This is brought to view by tenaculum in *F*.

a tiny sharp curette on the canal (Craig or Delatour). The sensation imparted by the gristly lining of these long standing cases is as if one were scraping over the back of linoleum or Brussels carpet. This is the very condition for which the delicate cautery stripe works promptly. The canal is carefully dried out, the single tenaculum steadies it, and a longitudinal application is made on the two opposite sides of the wide oval passage. If necessary the side not touched may be striped two weeks later. Undue contraction, or tender scars have not resulted from any of these procedures. The conditions are quite different from the nose with its mucous membrane over bone.

The cystic cervix is especially adapted to cautery treatment. There are some cervices so riddled with deep cysts that only complete amputation will relieve the pressure-ache. But even these are worth trying to cure with the fire-needle. Only, if one fails and desists, he must defer operation until the suppuration has entirely disappeared. The spear may cause a better depletion of a congested cervix, but its opening does not gape till granulation has closed the cavity, as is the case with the

Fig. 5.—Varicosities of the cervix of unusual size treated with a low degree of heat in the wire.

cautery puncture, and therefore the same pocket may fill again, if cleanly cut open. The cysts that the finger feels and the eye cannot find may be made visible by finger-tip pressure, quick exit of the finger, and a stab at the blanched spot that remains just long enough to reach. The tenaculum draws open the canal for interior nabothian distentions. For deep punctures the wire is to be very hot in order to keep on penetrating.

Fig. 6.—Cervical polyps (not life-size). Removed at base by hooked cautery wire slid up the stalk.

In vascular and varicose womb mouths the wire should carry as little heat as possible—unless a decongesting ooze is desired. The amount of relief afforded by opening cysts is evidenced by the return of patients with the request that the old ache be eased. They recognize the recurrence of tension. The puncture is curative, the intervals of recurrence lengthening from months to years. Cysts and cancer seem not to belong in the same cervix. Eversion is responsible for some erosion and irrita-

tion. The longitudinal cautery stripe inrolls the surface and relieves certain cases.

Polyps are best handled with the cautery tip if the stalk is accessible. If not, the fine wire loop works better. Varicosities of the cervix are part of a general pelvic venous stasis and so of themselves of little moment. A swollen varicose cervix may "drag." In this case a low-heat puncture of any visible veins shuts them off and shrinks the cervix.

Objections. 1. Painfulness. One inflamed surface out of three or four is acutely sensitive. For these phenol in full strength to anesthetize, and Churchill's iodine after, are the considerate measures, but less effective. 2. Unnecessary elaboration and cost. It is true that argentic nitrate in 10-16 per cent strength is the treatment for endocervicitis (except cystic forms) which we chose if restricted to a single measure. Polyps we can avulse, cysts we can puncture with the narrow eye-knife or Buttle spear. But the gynecologist cannot well dispense with the fine, cautery tip for other purposes, such as urethral caruncle, chronically infected urethral glands, and to stab the small hemorrhoid. 3. Noise and apprehension. The motor slung under the floor obviates these. It is said that frequent application of argentic nitrate in borderline cases favors carcinomatous change, whereas the cautery is the ideal remedy in case of doubt.

SUMMARY

Thin, deep cautery lines (or punctures) heal and inroll the granular, everted cervix, and furnish a successful substitute for operation in a considerable number of cases. This is the treatment of choice with patients who are poor operative risks. Also when deferring repair until childbearing is overpast. For the cystic cervix it is the chief remedy. With rebellious discharges from an enlarged canal, linear cautery does well. This, an office treatment, with the delicate nasal cautery tip, entirely replaces the old Paquelin technic.

438 WEST 116TH STREET.

ABDOMINAL ABORTION*

By Franklin S. Newell, M.D., Boston, Mass.

BY THE term abdominal abortion is meant the termination of pregnancy by abdominal hysterotomy, in preference to a pelvic operation, before the period of viability has been reached. This operation is in my opinion indicated in patients to whom the continuance of pregnancy offers a serious menace to life and certain injury to health owing to the presence of some chronic disease.

The principal advantages of this operation are due to two factors. First, that it can be performed under local anesthesia on patients who are considered bad risks for the administration of a general anesthetic. And, second, that since the contraindication to pregnancy is a permanent one the termination of the pregnancy can be accompanied by sterilization of the patient. The present pregnancy can be ended and future pregnancies made impossible at a single operation with a minimum of risk. Although in this paper I shall go more fully into the technic under local anesthesia, I wish to state that I prefer to operate under a general anesthetic if the patient's condition warrants it, and that I do not advocate abdominal abortion in patients who can safely be given a general anesthetic unless sterilization to guard against future pregnancy seems desirable.

It is well recognized by the majority of the medical profession that the occurrence of pregnancy in women who have severe chronic disease is often attended with such danger to life and health as to render the induction of abortion a justifiable procedure, and it has been the custom of the medical profession to advise and perform such abortions after due consultation. Further, if the indication is a permanent one, it is customary to advise the patient that under no circumstances should pregnancy occur again, for the reason that the only alternative under such circumstances to prevent the patient's going through pregnancy, at the expense of her health at least, is repeated abortion, and repeated abortions on the same patient are properly considered unjustifiable.

My experience has been, however, particularly in the lower classes in the community, that although future pregnancies may be absolutely forbidden, the patient often fails to follow the advice given either because of ignorance of the preventive methods to be adopted, or be-

cause of the failure of the methods advised, and the medical adviser is then confronted with the unpleasant alternative mentioned.

A certain proportion of the medical profession believes that it is not the function of the medical adviser to provide ways and means to prevent pregnancy and that the patient should be advised that pregnancy is dangerous and unjustifiable, and left to her own resources to prevent it. Such an attitude on the part of the profession seems to me nothing more than an attempt to evade responsibility which properly belongs to the medical profession. I believe that when a patient is advised that under no circumstances should pregnancy occur, the advice as how to avoid pregnancy should be given. I further believe that when it is recognized that a permanent condition exists which renders pregnancy so dangerous to the life or health of the patient as to warrant the performance of a therapeutic abortion, sterilization of the patient to render future pregnancies impossible is a justifiable procedure. I feel that unwillingness to adopt this course is a failure on the part of the medical profession to recognize and accept the proper responsibility entailed by the advice given. My experience has shown that no matter how careful advice may be given in certain cases, pregnancy does sometimes occur, and I believe it is preferable to make pregnancy impossible rather than to be content with forbidding it.

If the medical adviser feels that under no circumstances should future pregnancy be allowed and is willing to accept the responsibility of making it impossible, he has a double choice of procedure open to him. He may either terminate the pregnancy by one of the ordinary methods and at a subsequent time sterilize the patient by an abdominal operation, or have her treated with radium or the x-ray and sterility induced by the destruction of the ovaries thus producing an artificial menopause, or he may terminate the pregnancy and sterilize the patient at the same time by abdominal hysterotomy followed by the amputation of the uterus or excision of the tubes from the uterine cornua. My own preference is to accomplish the abortion and sterilization at a single operation rather than to subject the patient to two operations to accomplish the desired result.

The ordinary indications for which abdominal abortion may be indicated are first, serious cardiac lesions which have at some previous time whether during pregnancy or not resulted in decompensation, particularly in patients who are showing signs of failing compensation early in the present pregnancy, and second, cases of chronic nephritis where the disease is distinctly progressive and where the previous history shows that recent attempts at childbearing have resulted in the birth of stillborn children in spite of adequate medical attention. These two classes of cases seem to me to offer absolute contraindications to pregnancy and there is practically no chance of suffi-

cient improvement taking place under any method of treatment to give any hope that pregnancy may be undertaken at some future time with any chance of a successful termination.

There are certain other indications which may warrant the operation in rare cases. For instance, quiescent though not arrested pulmonary tuberculosis in patients who already have children would seem to me a proper indication both for the termination of the present pregnancy and for sterilization after due consultation with the patient. In such cases the danger to maternal life is very great, and the life of the patient should be preserved for her children if possible. Occasional cases of diabetes which do not yield to ordinary treatment may also offer indications for sterilization in addition to the termination of the pregnancy.

The operation finds its greatest usefulness, however, in patients with decompensated cardiac lesions in whom attempts to restore compensation have failed. In these cases the use of a general anesthetic may be possible, but in most cases I believe operation can be more safely performed under local anesthesia. I recognize that a general anesthetic may be given with relative safety to a certain proportion of these patients if given by a skilled anesthetist, but I believe that there is a small group of patients to whom the use of any general anesthetic is extremely dangerous, and therefore believe that the performance of an operation under local anesthesia is a distinct advance. I personally prefer to use a general anesthetic in all cases where the risk to the patient does not seem too great owing to the increased freedom of choice of operation which it permits, but do not believe that any general anesthetic, no matter how carefully it is given, is safe in certain cases of cardiac decompensation.

When it is considered unwise to use a general anesthetic, our choice is spinal anesthesia, paravertebral anesthesia, or local anesthesia. I have not had sufficient experience with spinal anesthesia in cardiac decompensation to speak with authority, but I should hesitate to employ spinal anesthesia on a patient with decompensated heart on account of the sudden changes of blood pressure which accompany this method. The administration of paravertebral anesthesia is familiar to but few men in this country, and it is a long and exhausting process for the patient, and after a limited trial of this method I have become convinced that it is not a satisfactory method of anesthesia in patients with cardiac decompensation. I have therefore adopted local anesthesia preferably preceded by the administration of morphine and scopolamine in cesarean section at full term in cases in which the use of a general anesthetic has been advised against by a competent medical consultant, and, with the exception that in the occasional case first intention healing of the abdominal wound has been

interfered with by too free an infiltration of the abdominal wall with novocaine in a patient whose general resistance has been below par, I have been perfectly satisfied with the results.

I believe it is a great advantage to the patient and also to the operator that the patient should not be fully conscious during an operation under local anesthesia. I think that it militates markedly against the success of the anesthetic to have a patient hear what is going on in the operating room and I believe it is especially important for the operator not to keep asking the patient if the operation is painful. Many patients are exceedingly nervous about operation under local anesthesia, and if the operator keeps asking the patient whether his manipulations are painful, sooner or later the patient will decide that she feels pain and begins to complain, whereas if the patient is asleep at the beginning of the operation and the technic is carefully carried out, there will be no complaint of pain during the operation and next day the patient will have no memory of any discomfort.

This use of the twilight sleep sequence followed by local anesthesia, having proved successful in cesarean section at term, has been tried in several instances on patients relatively early in pregnancy, the earliest case in my series being between ten and eleven weeks according to the dates as well as to the physical findings. I feel that these early cases offer the most severe test as to the efficiency of this method of anesthesia because the tension on the pelvic peritoneum which must be employed to bring the uterus to the abdominal wound is perhaps the one manipulation most likely to cause pain and is therefore the most severe test of the efficiency of the anesthetic. If the operation can be done successfully in the early weeks of pregnancy in spite of this handicap, it can be done at any subsequent period with increasing ease as the uterus becomes larger and larger.

It has been my experience in the occasional case, especially in exceedingly nervous women, that the morphine-scopolamine fails to have the desired effect in producing quiet sleep and the patient may become rather excited as has been constantly reported in the use of twilight sleep in normal labor. This condition renders operation under local anesthesia practically impossible, and in one case in my series a patient with a badly decompensated heart insisted on remaining in a sitting position and could not be persuaded to lie down. Ether had to be employed on this patient although she was considered a bad risk for general anesthesia. The eventual result was satisfactory although the anesthetist reported the patient as being pulseless throughout the operation, and the ease and comfort of the operation from my standpoint were distinctly interfered with although the patient eventually did well.

When the abdominal abortion is performed under a general anesthesia it requires no particular description. The ordinary steps of the

abdominal cesarean section are followed in miniature and the patient
is then sterilized either by supravaginal hysterectomy or by the ex-
cision of the tubes from the uterine cornua. I find that the preservation
of the menstrual function means a good deal to comparatively young
women, and in these cases I believe it wise to sterilize by excision of
the tubes rather than by hysterectomy although the uterus is a useless
organ.

The technic of the operation under local anesthesia warrants detailed
description because I feel that the success of the operation depends on
proper attention to details, and I have seen some lamentable exhibi-
tions in cases in which the proper technic was not followed.

In the first place the patient should be brought under the influence of the mor-
phine-scopolamine in a quiet room near the operating room and in the majority
of cases she can be brought to operation sleeping peacefully and usually will not
rouse fully during the operation if care is taken to avoid rough handling and
unnecessary noise. The technic which I employ, which was first suggested to me
by Dr. F. C. Irving, is as follows:

About two and one-half hours before the time set for operation the patient is
given 1/6 of a grain of morphine and 1/200 of a grain of scopolamine by hypo-
dermic injection. The scopolamine is repeated at 40-minute intervals, but it is
not usually necessary to repeat the morphine. Three or four doses of scopolamine,
but occasionally more, are necessary to produce quiet sleep. The patient's eyes
are covered, the ears plugged, and she is brought to the operating room as quietly
as possible, and care is taken not to allow any unnecessary noise or conversation
in the operating room.

The field of operation is prepared quickly with iodine and the site of the incision
is anesthetized by 1/2 per cent novocaine, care being taken to anesthetize the
skin thoroughly and also the fascia layer. I believe it is unnecessary to especially
anesthetize the parietal peritoneum, for in my experience the peritoneum is either
much less sensitive than has been alleged or is sufficiently anesthetized by the in-
jection of the fascia to render manipulations painless. As soon as the abdominal
wall has been carefully injected the operator must then make up his mind to wait
the proper length of time before beginning the operation. This is very essential
as the novocaine is a slow acting drug and does not produce anesthesia until after
a definite interval has elapsed. If the patient is sound asleep at the time of the
injection of the abdominal wall, five minutes is all the delay necessary for the
novocaine to take effect before beginning the operation. If the patient is restless
and moves about on the table, an interval of at least ten minutes should be
allowed.

After the proper interval the abdomen is opened in the usual way, a low
median incision being made just above the symphysis. If the pregnancy is of more
than three and one-half month's duration, the uterus can easily be manipulated
through such an incision without marked traction on the peritoneum. In earlier
cases the uterus must be grasped with hooks and drawn up to the wound, at
times considerable traction being necessary. This may cause some reaction on the
part of the patient, but as a rule no great amount. The uterus itself is practically
non-sensitive and can be opened at will, the ovum removed with the finger and the
wound sutured without any marked reaction on the patient although some patients
will move more or less and groan occasionally.

If sterilization is to be done under local anesthesia the most satisfactory method
is excision of the tubes from the cornua of the uterus. In my experience the in-

jection of a syringe full of novocaine into the inner portion of the broad ligament and the cornua of the uterus is advisable before sterilization is performed. The presence of old abdominal adhesions increases the difficulty of the operation to some extent since peritoneal adhesions are extremely sensitive, but they can be injected with novocaine and cut and tied if a proper interval is allowed for the action of the novocaine. I believe the manipulations necessary to remove the uterus under local anesthesia would probably cause too much pain owing to the traction on the peritoneum which would be necessary, and have not attempted this method of sterilization under local anesthesia. The uterine incision and the abdominal wall are closed as in any ordinary cesarean section and the patient is then treated as any other laparotomy.

It has been my experience on questioning the patient the day after operation as to the amount of pain suffered during the operative procedure to learn that even in the cases where the patient apparently felt a good deal while the operation was going on as evidenced by restlessness and groaning, there was absolutely no memory of any discomfort during operation. Surgical shock has been largely absent in my cases. Postoperative vomiting has not occurred with this method of anesthesia, at least not in my limited experience.

I feel strongly that this method of operation is a distinct advance for patients who present permanent contraindications to pregnancy and in whom sterilization is considered justifiable. There is less shock and less loss of blood than in abortion by the pelvic route, and in addition the patient is protected from recurrence of pregnancy.

I do not wish to be understood as advocating abdominal abortion under local anesthesia in patients who are good risks for the use of a general anesthetic, but I have seen a patient with a decompensated heart lesion die on the table during the preliminary stage of anesthesia when ether was being given by a competent anesthetist and believe that such disasters may be prevented by the use of local anesthesia preceded by the morphine-scopolamine sequence.

In addition I would say that I should not advocate this method of operation, that is abdominal abortion and sterilization, for any patient unless careful study of the case showed a definite contraindication to future pregnancies which was of a permanent nature. I believe it to be an operation for the unfit patient whose life is threatened by a continuation of pregnancy and to whom future pregnancies are equally dangerous.

443 BEACON STREET.

SYPHILIS AND CHILDBIRTH; OBSERVATIONS ON 661 CASES OCCURRING AT THE PHILADELPHIA GENERAL HOSPITAL*

By Edward A. Schumann, M.D., and Charles S. Barnes, M.D.,
Philadelphia, Pa.

SYPHILIS, that protean destroyer, may be found as a basic factor in almost any department of medicine or surgery. Nowhere, however, is the sinister and remote activity of the treponema more manifest than in its effect upon the fetus *in utero* and upon the infected mother carrying a syphilitic child.

The history of syphilis in obstetrics is interesting. Beginning with the recognition of hereditary infection by Paracelsus in 1529, the transmission of the disease from a mother to her infant and the pathology of the process was generally regarded as being a simple infection of the ovum by the unknown causative agent of syphilis. Then came a more detailed investigation of large case groups, and certain peculiarities of parental transmission of the disease were brought out. Thus, Colles' law, formulated in 1837, revealed the fact that occasionally an apparently healthy woman might give birth to a manifestly syphilitic infant and further that she might nurse that infant and she herself remain free from the disease. Then there appeared the law of Profeta which held that a woman presenting evidences of active syphilis, might give birth to a healthy infant, which, in turn, remained immune to infection via the maternal milk.

As a corollary to Colles' law it was believed that the infective agent of syphilis could be carried into an ovum by the spermatozoön, the mother remaining unaffected. With the discovery of the Wassermann reaction and the treponema these various laws were found to be untrustworthy and presently the dictum was evolved that every syphilitic mother gave birth to a syphilitic baby and that every syphilitic baby had a syphilitic mother.

It has become the custom to diagnosticate syphilis by means of the Wassermann reaction alone, especially when the disease is in a quiescent state, producing no symptoms. The writers hold no brief for this practice which is obviously unreliable, but it is nevertheless the fact that in most hospitals, at least in the gynecologic and obstetric services of those with which we are familiar, it is the rule to make routine Wassermann examinations of the blood of mothers, as well as from neonatal infants, and in a broad sense to regard as syphilitic all those who give positive and as nonsyphilitic all those having negative reactions, except in

special instances where diagnosable lesions are found associated with a negative Wassermann. In obstetric practice diagnosis by means of the Wassermann reaction is practically the only reliance of the obstetrician, since "obstetric syphilis" offers so very few demonstrable lesions in the mother that a diagnosis by clinical means is so rare as to excite comment when it may be made.

The writers, observing in the Philadelphia General Hospital, the result of routine blood examination and the acceptance of the blood report as evidence for or against the presence of syphilis, questioned the value of the whole procedure and have surveyed the records of a series of cases, to determine just what conclusions, if any, are to be deduced from routine Wassermann reaction. Several queries naturally suggested themselves, about as follows:

1. What proportion of parturient women in the Philadelphia General Hospital show the existence of syphilis as determined by the Wassermann reaction?

2. What proportion of these women give birth to living children and how many have stillborn infants?

3. Do any, and if so, what proportion of syphilitic women, give birth to healthy infants, showing negative Wassermann reactions?

4. Do any, and if so, what proportion of women not presenting clinical evidence and having negative Wassermann tests give birth to babies having positive Wassermann reactions or clinical evidence of syphilis?

These queries were answered more or less satisfactorily (generally speaking less) by a critical review of a fairly large group of cases.

1. In 661 cases occurring in the obstetric department of the Philadelphia General Hospital, in which Wassermann tests had been performed upon the mother, there were 192 which were reported positive, or an incidence of maternal syphilis in the obstetric department of 27.8 per cent.

When one takes into consideration the nature of the Blockley population (slightly more than half colored in our series) and the fact that many of these women were afflicted with gonorrhea or chancroids or both, this incidence is strikingly low and suggests that a latent form of the disease was probably present in a considerable number of the negatively recorded cases.

2. The question as to stillbirths and living births among syphilitic women, was rendered possibly more obscure by the interesting statistics brought out by our analysis of case records. Of the 192 women having positive Wassermann reactions, 19 stillborn infants were delivered, or 10 per cent. However, among this same 192 women, 149, or 78 per cent, gave birth to living children. (A number not included left the hospital before delivery. This would increase both classes about proportionately.) Therefore of every five births in supposedly syphilitic women, four were living

infants apparently healthy, to one stillborn. In our series, 19 stillbirths resulted from 192 positive Wassermann cases, while only eight stillbirths occurred in the 469 negative Wassermann mothers, thereby showing the importance of syphilis as a causal factor in stillbirths.

3. Do syphilitic women give birth to apparently healthy children and in what proportion?—Profeta's law again. Among the series here reported 29 syphilitic women (that is Wassermann positive cases), 29 gave birth to 29 Wassermann positive or macerated infants, showing clearly the definite and intensely transmissible nature of the disease. But on the other hand 26 syphilitic, or at least Wassermann positive, women gave birth to 26 children presenting no clinical evidence of syphilis whatever, certainly to the time of their discharge from the Hospital, and all having negative Wassermann reactions based on blood taken from the cord at the time of delivery. There were then practically as many nonsyphilitic as syphilitic infants born to mothers reacting to the Wassermann test.

Fordyce and Rosen on reporting studies in Columbia University College conclude that the Wassermann test at birth in the infant is not to be relied upon. Ten days after birth is a better time for accurate interpretation of the serology. A negative Wassermann test in the face of clinical manifestations may occur in congenital syphilis. Therefore careful clinical examination is important. Bar and Daunay express much the same view as to the serology, saying that the best results are obtained from the cerebrospinal fluid.

4. Do apparently nonsyphilitic women give birth to frankly syphilitic infants? Colles' law. In our series six women with negative Wassermann reaction and with neither definite history nor physical signs of having or having had lues, gave birth to children having strongly positive Wassermann reactions.

The foregoing figures, fragmentary though they are, may readily serve as a basis for certain deductions and speculation along the line of the transmission of syphilis from a mother to her child.

In the first place, it is at once apparent that the routine method of diagnosis by one Wassermann reaction made on the mother, and a cord blood test made on the child at time of birth is almost worthless, and a study of records so made (as was ours) leads one to baffling half truths.

Kolmer, in a recent address entitled "Prenatal syphilis, with a plea for its study and prevention," urges detailed and careful parental study and treatment and says, "For the study of the incidence for prenatal or congenital syphilis, the Wassermann test alone with the blood of the child is of limited value and cannot be relied upon to give complete information. It is prone to yield an erroneous negative result in latent congenital syphilis, although invariably positive in active cases with lesions

and symptoms." The lutein skin test he considers of particular value and urges that children be subjected to thorough clinical studies.

The number of syphilitic women giving birth to living and apparently well children is significant. Most of the patients were entirely ignorant of their condition, had never undergone treatment of any sort, and yet were delivered of large, well nourished and lusty infants. These patients, furthermore, did not present the classical history of a long series of miscarriages, but were largely primiparae or had had one or two previous living births.

These facts lead to the interesting speculation, that perhaps, as has been stated, there may be a marked variance in the virulence of separate strains of spirochetae, or do the laws of Colles and Profeta still apply, and does it remain a fact that the placenta may act as a barrier to infection? In this connection it should be remembered that the transmission of spirochetae from mother to child has not yet been definitely shown. A recent personal communication from Professor J. Whitridge Williams, of Baltimore, to one of us states that the spirochetes are exceedingly difficult to find in the placenta and that many slides must be examined before a single one can be found in a villus. Dr. Williams has no reference to the spirocheta having ever been demonstrated in the placenta and in the decidua at the placental site in the same case.

Obviously it is true that inasmuch as the life history of the treponema is not known, there may be a stage in the cycle of development of the organism during which it is not yet manifest to an observation, and during which stage placental transmission takes place.

The writers take the view, however, that inasmuch as placental transmission has not been definitely proved and that there are certainly many cases recorded, some in our series, where a Wassermann positive mother gave birth to an infant which showed no evidence whatever of syphilis, either clinical or by blood examination, it is only fair to assume that Profeta's law has not been disproved and that the phenomenon is still possible though of uncommon occurrence.

The reverse of the situation, or where a woman presenting no evidence of syphilis gives birth to a frankly syphilitic child, offers still more interesting material for speculation. The whole subject of the paternal transmission of syphilis to the ovum is shrouded in mystery and no facts of importance have been elicited. Hirst states that a syphilitic infection is due to syphilis in the mother and that syphilis cannot be transmitted from a syphilitic father direct to the embryo without infection of the mother. It is, of course, well known that the spirochete, being three times the size of the head of the spermatozoön, cannot well be introduced into the ovum by this means. These organisms have been found in the seminal fluid and this fact has given rise to the supposition that the treponemas are carried into the ovum by way of this medium. Such view has not been

experimentally proved and, indeed, it seems highly improbable that seminal fluid can reach the fundus uteri or the tubes where fertilization takes place. Here again the question of a stage of spirochetal development in which the organism is sufficiently small to be borne into the ovum on the spermatozoön, is the most probable reason for paternal infection. Granting thus that the ovum may be infected by the father, does the mother necessarily become infected, or may the placenta act as a barrier? Reasoning *a priori*, the latter is most probably the case, inasmuch as placental transmission has not been proved. Edgar admits that "we know little of germinal and embryonal syphilis."

It may be said in conclusion that the entire subject of hereditary and congenital syphilis requires an immense amount of research in order to establish the true laws underlying it, and that with the resources at our command, hospitals having obstetric services should institute an investigation of the problem, utilizing the obstetrician. the pathologist. the serologist, the pediatrician and often the correlated members of the staff in the search for its solution.

348 South Fifteenth Street.   (*For discussion see page* 655.)

PELVIORADIOGRAPHY AFTER FABRE'S METHOD

By J. Warren Bell, M.D., Minneapolis, Minn.

TWO years ago I was attracted by the description of a method of pelvimetry by Fabre, based upon an intelligent use of the x-ray.

Upon reviewing American literature with reference to this work, I found it in print but once, and then only given passing mention in Dr. William's Text Book of Obstetrics. I resolved to try the process, and I have convinced myself that. with practice. this method can be made to give excellent results. Through the courtesy of Dr. J. C. Litzenberg six plaster models of deformed pelves were studied at the University Hospital of Minnesota by the operator, Miss Bagameil. The results of this study showed that the greater the deformity of the pelvis the more difficult it became to place the frame in the proper position for obtaining accurate results. Where the deformities were not extreme, some of the results very closely coincided with the true measurements of the models.

Next a skeleton was placed in the frame (Fig. 2), and from the print the outline of the inlet was drawn upon graph paper and then cut out of cardboard. This piece of cardboard fitted within 0.5 cm. the size of the inlet.

I quote from the text of the originator of the method the following, with due apologies for the translation.

Precis d'Obstétrique par Fabre, p. 512.

As a result of the difficulties of application of pelvimetry by Focher, I decided to apply radiography to the study of contracted pelves.

Pelviography presents some very important advantages: the process is painless: it is of easy application during pregnancy, and gives very exact results: by an automatic process, the accoucheur may have precise therapeutic indications, and after confinement, it verifies the fact, if the operations employed were indicated.

The disadvantages of radiography are due to the nature of the x-rays, which leaving the cathode, diverge and distort the image. If one tries to reproduce the outlines of the superior strait, the image is not only enlarged, but furthermore the distortion is irregular, for it is impossible to place the patient in such a position that the plane of the superior strait is exactly parallel to the photographic plate. The consequence is that the bony portions most distant from the sensative plate are enlarged and deformed: the portions near the plate are less distorted.

Fig. 1.—Lateral view of patient, showing spinal deformity.

Fig. 2.—Frame, with skeleton in the position of patient. Legs are removed.

Indications of Metric Radiography.—

1. Before marriage. In all cases where the skeleton presents a congenital or acquired deformity, congenital dislocation of the hip, either unilateral or bilateral, infantile paralysis and hemiplegia; white tumors of the lower limbs, coxalgia, early or late rickets, etc.

2. During pregnancy. At a time anywhere in pregnancy there is an indication for radiography of the patient whenever one has the presumptive signs of lesions of the pelvis, and more emphatically when one has absolute signs. The therapeutic decisions should be based upon exact measurements of the inlet.

3. After confinement. Every time that the mechanism has presented anything particular, or that the abnormality cannot be explained by clinical examination. The conduct of the next confinement would then be established with certainty.

*Process of Metric Radiography.—*This consists of radiographing the inlet at the same time that the region is being measured by metallic scales (rules) with lines one centimeter apart. The scales are placed in the plane of the diameter of the pelvis which one wishes to measure. These scales undergo the same distortion as the inlet:

upon the plate after development, the number of teeth correspond to the number of centimeters, whatever the dimensions of the image.

Metric radiography only gives accurate results for the measuring of the inlet. To obtain this result it is necessary for the plane of the frame to coincide as nearly as possible with the plane of the inlet. But the different diameters of the inlet are not in the same plane. It is for this reason that my frame is double and is composed of four toothed scales which gives two, the anterior and the posterior (which) are in the transverse pubic plane that contains the oblique and transverse diameters, and which gives two lateral scales in the promontopubic plane. Upon the radiogram the four scales make possible the establishment of a quadrangle deformed by the x-rays, but which in extent, corresponds to squares one centimeter on each side. The coincidence of the frame and the planes of the inlet does not have to be absolute to give exact results.

Difficulties of Application of the Method.—

1. The nature of the rays employed is not very important. All the radiographic machines have given good radiograms of the pelvis. I, myself use a coil of 50 cms. spark, the automatic interrupter of Gaiffe, a Mueller tube. In the coil I pass
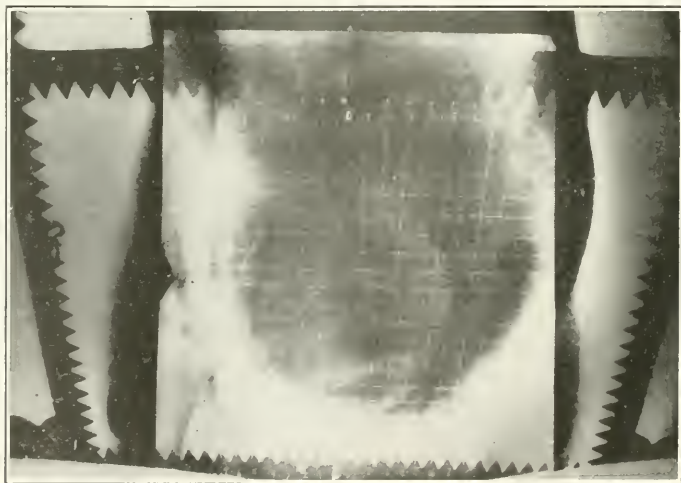
Fig. 3.—Radiogram of pelvis showing notches in frame, and lines joining same.

three or four amperes at 110 Volts; in the tube five milliamperes; the time of exposure is from three to five minutes, the spark compensation being ten centimeters. With the new installation of intensive radiography the picture of the pelvis is obtained in ten to twenty seconds. It is essential not to have the rays too penetrating, lest they traverse the promontory without giving the image. The process is applicable at any period of pregnancy.

2. Distance of the tube from plate. I have adopted a distance of 50 cms. as a fixed distance. At this distance the harmful influences upon the fetus or the skin of the mother are nil. I have never encountered an accident.

3. Necessity of the ventral position.—In this position alone it is possible to obtain a good image of the inlet; only then is the promontory well defined. The importance of this particular point is considerable and explains our good results. On the contrary, in the dorsal position, the image reproduces the posterior surface of the sacrum, the promontory is invisible and the circumference of the innominate line is not reproduced.

Manual Operation.—

1. Determination of the point of the pubic landmark. The patient is placed in the dorsal position. One determines the upper border of the pubis and one cm. below this border one traces with a ruler and a dermographic pencil, a horizontal line which extends over the sides of the thighs: this line permits us to be assured, when the patient is lying on her abdomen, that the anterior scale of the frame is in the proper relation to the upper borders of the pubis.

2. Determination of the posterior landmark. The patient lies on her abdomen. One traces a horizontal line which passes across the dimples of the rhomboid of Michaelis: this line corresponds to a line parallel with the transverse pubic plane of the inlet. Above this, one draws a second line, 3, 4, or 6 ems. according to whether the promontory has been established low, normal, or high by vaginal examination. In cases where the vaginal examination should not be done (as before marriage), the point for the upper landmark is fixed at 4 cms. above the line through the dimples.

3. The patient is placed in the frame. The patient is placed in the frame, lying upon her stomach, the elbows in front on the cushion. The pubic scale is made
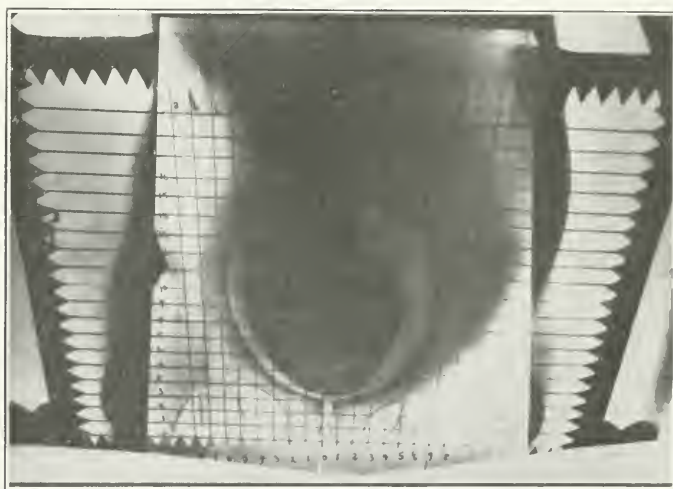
Fig. 4.—Same radiogram retouched.

to coincide with the line which is visible on the lateral aspect of the thighs. The dorsal scale of the transverse pubic plane is in contact with the line of the dimples: the scale of the promontopubic plane (scale enclosed in wood) is in contact with the upper line corresponding to this plane.

4. Manner of placing the tube. The tube is placed upon a vertical median line, 50 cms. above the plate, and the normal rays of incidence fall at the side of the feet 20 cms. from the pubic scale.

5. Duration of exposure. The exposure with our installation lasts from three to six minutes, depending on the corpulency of the patient. During pregnancy the time of exposure is about six minutes. With the installation of the intensive radiography the exposure is less than a minute; with the intensifying screen this is reduced to ten seconds.

6. Development of the negative. The negative is developed exactly like an ordinary photographic plate.

7. Ruling the negative. The opposite teeth of the scales are numbered with pencil, and the corresponding teeth on the pubic scales are joined by straight

lines traced with pencil upon the negative. The teeth of the lateral promonto-pubic scales are joined by straight lines. One thus obtains an irregular quadrangle with sides of one cm.

8. Location upon squares. To reduce the radiogram and give the inlet its true dimensions, it suffices to reproduce the curves of the inlet upon one cm. square "graph" paper, by marking the points where the curve cuts the lines traced upon the negative.

I have been able to compare, in a certain number of cases, the radiogram made during life, with the pelvis, recovered at autopsy. The errors were about 2 mm., that is to say, the process is extremely accurate and much more precise than with all the other clinical processes of measuration.

During the last ten years the process has rendered me great service from the clinical point of view, and I have been able to establish a true radiography of the pelvis actually in 638 radiograms.
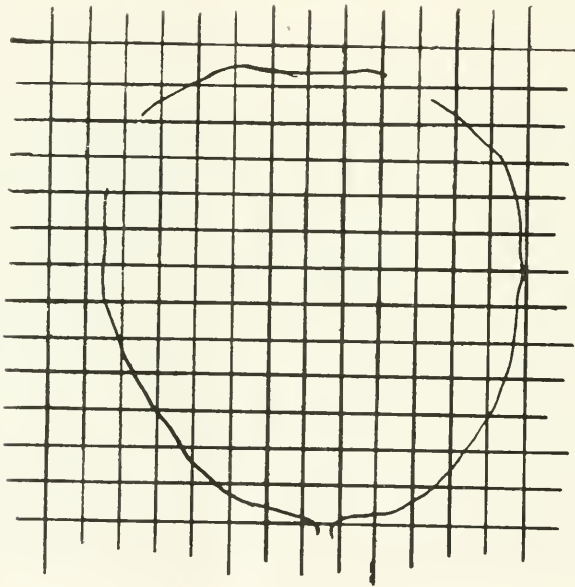
Fig. 5.—Showing outline of pelvic inlet plotted on graph paper with centimeter squares.

The above paragraphs show what this method has done in France. I present herewith a case history, with notes pertaining to the application of this method.

In December, E. F. appeared at the Free Dispensary. She was about 4 feet 6 inches tall, had a marked lumbar kyphosis and a slight scoliosis. There was a bump over the lumbosacral region which made the external conjugate measurement valueless. (Fig. 1.) The patient had been ill as a child with spinal caries.

There was a $7\frac{1}{2}$ months' pregnancy, with cephalic presentation, occiput lying partly in the inlet. The outlet was measured by several men, and the bituberous measurement was 7.5 cms.

By vaginal examination the head was found partly in the pelvis and in this position it interfered with taking the internal oblique diameter. The measurements of the pelvis externally were as follows: Interspinous, $23\frac{3}{4}$ cm.; intercristal, 25 cm.; intertrochanteric, 26 cm.; external conjugate, 20 cm.

The accompanying radiograms were made.

Technic.—The patient was placed in the ventral position, with a large casette beneath her abdomen which contains the 17 by 22 inch film and an intensifying screen 10 by 14 inches.

The tube was placed at a point towards the patient's feet 50 cms. from the symphysis, and 50 cms. from the table. The tube is so tilted that the direct rays enter the outlet of the pelvis and leave through the inlet.

The frame seen in the illustration, is made of wood, and is adjustable to the size of the patient. The frame is applied as nearly as possible to the plane of the inlet.

This plane is determined by the three points:—the top of the symphysis, and the two dimples of the posterior inferior spines of the ilium.

The wooden frame contains a lead layer with notched edges, the notches being one cm. apart.

The film must be large enough to show the shadow of the entire frame.

Reading the Film.—By joining opposite notches the accurate measurements of the picture of the pelvis can be quickly obtained.

In the illustration these connecting lines have been drawn in (Figs. 3 and 4).

From this film, with the unavoidable distortion, a true outline of the inlet has been made upon graph paper with centimeter squares (Fig. 5).

The accompanying sketch shows this outline after the distortion has been removed.

The patient was delivered at the University Hospital, on Dr. Litzenberg's service, and when discharged it was found that the internal diagonal conjugate was larger than 12 cm. I was able to verify this later, and feel justified in reporting the case as a successful application of Fabre's method of radiopelvimetry.

600 PHYSICIANS AND SURGEONS BUILDING.

FIBROMYOMA OF THE UTERUS ACCOMPANIED BY HYPERTHYROIDISM

By WILLIAM M. THOMPSON, M.D., F.A.C.S., CHICAGO. ILL.

THAT a relationship exists between the sexual system and the thyroid gland has long been known. The ancients recognized the thyroid as the sex gland in man and animals. Paleontologists have demonstrated the existence of the thyroid as derived from the uterus of paleostrean ancestors. Hypo- and hyperthyroidia as a factor in sexual changes has been known for several centuries, but it was not until 1859 and 1862 that Charcot's publication brought the knowledge of his day into tangible form. Until recent years our knowledge was chiefly clinical, probably beginning with Halstead[1] in 1888 and 1889, but modern observers have been adding experimental to clinical data, until today the thyroid is recognized as the chief regulator of metabolism. The iodine or iodine-containing hormone of the thyroid is the most powerful activator of metabolism as a stimulus of the oxidation process. This stimulus causes a work hypertrophy of the gland, which is evidenced in menstruation and pregnancy.

It would be quite easy to work out the sex relationship from experimental and clinical data were it not for the fact that we now enter the realm of the endocrine[2] chain which controls the growth and development and functions of the whole body. Experimental evidence has not yet reached such exactitude as to the thyroid, the adrenal, the hypophysis and the ovary. This field of experimental medicine is so vast and with depth so far unsounded that one enters with trepidation into such a discussion. There are numberless clinical reports, but they lack correlation and are sometimes conflicting. The experimental evidence to date is meager and unsatisfying.

But in the meantime our patients are coming to us with their problems of artificial menopause following hysterectomy, of menorrhagia, metrorrhagia, sterility, hyperthyroidism and myoma, and it is no longer permitted to dismiss the subject with the diagnosis of hysteria or neurasthenia. The ovary, the thyroid and the adrenal glands are the most important in relation to gynecology and obstetrics. Perhaps the pituitary should be added to this list. Each one of these glands has been studied as to its direct relation to the sexual system. In 1917, the American Gynecological Society[3] published a symposium on the relation of the glands to gynecology and obstetrics. A review of these contributions confirms our belief that the clinical study and experiments so far have only brought out the individual relationship of each gland to gynecology and obstetrics. It remains for our laboratory workers to collaborate and preserve their records that we may better understand the interrelationship of the glands. Vincent[4] in describing the functions of the adrenals notes the resemblance between the cortical adrenal cells and the interstitial cells of the ovary. The adrenal cortex (as well as the accessory cortical adrenals) is developed from the germ epithelium and the evidences are now strongly in favor of the view that it has certain important functions in connection with the growth and development of the sex organs. There is a considerable clinical evidence that tumors of the adrenal cortex are frequently associated with sex abnormalities. Hypertrophy of the adrenal bodies occurs during pregnancy. It has been noted by Halban that hair or down (due to adrenal activity) upon the face or body of a woman occurs during pregnancy.

Goetch[5] admits a close relationship in the function of the pituitary and sex gland and cites experimental evidence and clinical observations, that the overfunction of the anterior pituitary lobe is associated with overactivity of the sex gland.

The inefficiency of the pituitary secretion in the individual is followed by underdevelopment and genital aplasia in the child and retrogression in the adult. Primary alterations in the sex glands, as in pregnancy, and after castration, are followed by pituitary hypertrophy and hyperplasia.

L. Loeb[6] says that cyclical changes occur in the ovary and secondarily only in the uterus. The primary cyclical changes in the ovary are in sequence: Follicle ripening, ovulation and corpus luteum formation. Normally, the corpus luteum inhibits ovulation. During pregnancy the life of the corpus luteum is prolonged. The corpus luteum has a sensitizing action on the uterus.

Corresponding to and dependent upon cyclical ovarian changes, cyclical uterine changes occur. The cycle consists of heat, growth with associated glandular activity, then retrogression and interval:—heat probably due to maturation of the follicles and dependent on the absence of the corpus luteum, growth activity due to the corpus luteal secretion which is followed in the interval by a period of rest. Pregnancy causes a persistence of the corpus luteum and is characterized by an accentuation, but not a prolongation of the active phase, and an inhibition of the uterine cyclical changes throughout gestation. The corpus luteum substance subserves at least two functions, inhibiting ovulation, and producing a substance which causes growth in the uterus.

Marine[7] who has done an enormous amount of work on the thyroid of fish and dogs, as well as men, states that the thyroid enlargement seen during puberty, menstruation, and pregnancy, is really a work hypertrophy, a condition similar to simple goiter. Physiologically the iodine-containing hormone is the most powerful activator of metabolism known. It acts by stimulating the process of oxidation.

Puberty, menstruation and pregnancy[8] stimulate the thyroid and cause work hypertrophy. Hypertrophy may be prevented by supplying the iodine-containing hormone. There is evidence in man of the thyroid sex gland interrelation recognized in the female in association with the development of secondary sexual characteristics with menstruation and pregnancy.

Evidence, though meager, is obtainable, that would tend to indicate that the interstitial cells of the ovary, perhaps also the adrenal cortex play a major rôle in this relation in the female.

Physiology teaches that specific cells secrete only specific secretory products. It is not conceivable, therefore, that the cells of the thyroid can secrete a modified iodine substance, but that due to some inhibiting influence they secrete less or because of the stimulating influence of some focal infection or pathology in other organs coming under their influence, they secrete more. Pregnancy[8] increases the work of the thyroid and prolongs the life of the corpus luteum which prevents the ripening of the follicles in the ovary. Is it not possible that a growth of the uterus which increases the number and activity of the cellular tissue of the lining of the uterus may stimulate the thyroid to increased function? We know that pregnancy takes place in the fibroid uterus and that pregnancy stimulates the growth of fibroids.

Therefore, fibroids do not inhibit the function of the ovaries. Does the fecund uterus stimulate the thyroid directly or indirectly through the ovary, or does the secretion of the corpus luteum activate the thyroid?

It has been noted that ablation of the ovaries causes enlargement of the adrenal cortex as well as pituitary hypertrophy and decreases the activity of the thyroid. Cretinism is an example of hypothyroid and with undeveloped sexual organs. As an example of the adrenal and thyroid hypofunction in pregnancy, I would like to cite the case of Mrs. L. First and only pregnancy eight years ago. In the early months she began to show signs of toxemia. At the sixth month her symptoms were persistent vomiting, albuminuria, dry, thickened skin, loss of hair, and tachycardia, a situation which finally compelled the emptying of the uterus of an almost moribund woman. After a protracted convalescence of nearly a year, for a time she regained her health. Since then she has a number of times gone two or three months without menstruating, during which she shows symptoms of hypofunction of both thyroid and adrenals, a slow pulse, loss of hair, dry skin, bodily torpor, and lowered blood pressure. It is probable that the pregnant uterus exerts its influence upon the thyroid adrenals and pituitary through the ovary.

As an illustration, recall the growth and differentiation of the female from the male pelvis. The ovary activates the pituitary as does the testis in the male. Thus the influence of the ovary is not exerted independently but through other glands.

If instead of attempting to gather from our accumulate knowledge some system by which the direct influence of the secretion of one gland upon the rest of the chain can be analyzed, it would be much simpler if one could adopt the hypothesis that the ovarian[9] secretion when activated increases the iodine consumption and this demand is met by the thyroid with an increased iodine output. Certainly, the experiments of Marine and Lenhart[7] on fishes and men give some promise that this may be the case.

In 1881 Kaprezik pointed out the frequency of weakness of the heart muscle with uterine myoma. Since then many papers have been written on this subject. It is thought that from 40 to 50 per cent of cases of myoma show myocardial changes. Gleek made pathologic examinations which led him to conclude that brown atrophy of the heart muscle is characteristic of fibroids without hemorrhage, and that fatty degeneration is present when there is profuse hemorrhage from the fibroid.

In studying the case records of some of these reports of heart disease and myoma of the uterus, we find a surprising similarity in the symptoms to those of thyroid hyperfunction as expressed in the rapid pulse and chronic fatigue and muscular weakness. The effects of

hyperthyroidism upon the heart muscle[10, 11] are too well known to need repetition in this paper, but our attention has so frequently been drawn to myocardial disease with myoma that we have not always made a thorough examination of the condition of the thyroid, but have been content to stop with the heart. We do not wish to deny the direct toxicity of the thyroid on the heart muscle, but a closer study of some cases so reported will show that the following proposition and conclusion is more logical. As myomas become most troublesome as a woman approaches the menopause, and as this particular type of hyperthyroidia is most frequently met with at that time as described by Plummer,[12] then the thyroid which up to that time exists as a simple adenoma is stimulated by the toxicity of the myomata, and we have the excessive output of the thyroid hormone. This produces an increased metabolic rate and stimulation clinically evident by nervousness, tremor, loss of strength and weight and in the later stages of myocardial degeneration. Such women, with goiters that are easily thrown out of balance, may have shown symptoms previously from the effects of focal infection or pregnancy on the thyroid and arrive on the threshold of the menopause with an already damaged heart muscle.

The following cases illustrate the points that I wish to make:

CASE 1.—Mrs. M., aged fifty-two, married twenty-nine years, one child, menstrual history since January 1, 1920, has been irregular and severe. There was some leucorrhea. For three years she has had severe pain during the periods, which has increased lately. No loss of weight, has never been strong, has had treatment for years for hyperthyroidia and heart trouble. Examination: Well developed woman, weight 150 pounds; skin pale; muscles flabby; hemoglobin 60; tachycardia; pulse 120, tremor. Heart: Diminished first sound; systolic murmur; outer border reaching the nipple line; blood pressure, systolic 100; diastolic 70. Thyroid: Much enlarged, partially intrathoracic of the adenomatous type. She dates the beginning of the enlargement from puberty. Abdomen: Nodular tumor reaching five fingers breadth above the symphysis. Vagina: relaxed. Uterus: cervix pale, dilated two and a half inches; tumor presenting in the cervix about the size of a child's head. The patient was sent to the hospital for one week for observation and treatment. At the end of this time pulse dropped to 100. On April 5, 1920, total hysterectomy was done, leaving one ovary. She stood the shock of the operation fairly well, but in 24 hours a thyroid storm set in and pulse went to 160. There were tremors and exhaustion. Had it not been for the week's rest and digitalis, I believe she might have succumbed, for this condition lasted about ten days, at the end of which time the pulse had gradually dropped and the patient soon returned to her home. On the sixteenth of June her pulse was 100. She seemed improved, but complained of flushes. On the eighth of October, after walking some distance, her pulse was 100 and her heart action considerably stronger; also there was a noticeable diminution in the thyroid.

November 1, pulse 85; blood pressure 135-80; headache had disappeared; feels much less fatigued and can walk farther than she has been able to do for years; weight 165 pounds. Pathologic diagnosis: Fibroids, with a large intrauterine pedunculated fibroid tumor, 18 by 18 by 10 cm. Six fibroid nodules in the body of the uterus, otherwise uterine muscle normal. The important points in this history are: That this woman has never been strong since she passed puberty; that she has

noticed an intermittent enlargement of her neck for nearly twenty years, and while she only recently became aware of her pelvic condition, she has long known that she was not normal in that respect. The pain that she complained of during menstruation was the effort of the uterus to deliver this large pedunculated fibroid.

CASE 2.—Mrs. H., aged thirty-six, four children. A frail, delicate woman, weight 107 pounds; has weighed 130 when in good health. Suffered serious damage to the vaginal outlet and uterus during her first confinement, and also had thrombophlebitis of the left external iliac following another confinement. Neck: First examined in 1911; a goiter was noted. At that time the patient complained of being dizzy and weak. Her pulse was rapid and she had tremor. These symptoms followed each confinement with increasing severity. When she had recovered from her third confinement her lacerations were repaired and she improved materially, gaining more weight than she had ever had. Following her fourth confinement, the recurrence of the hyperthyroid symptoms was so marked that she presented herself for an examination. Her pulse was 120; large thyroid of the adenomatous type; mild exophthalmos. Heart: Soft first sound; irregular. Abdomen: Negative except for some pain and dullness over the symphysis. Vagina: Muscles thin and showing the scars of repair. Uterus: Large, retroflexed, filling the pelvis as is found in women between the third and fourth month of pregnancy when a retroflexed uterus fills the entire pelvis. Diagnosis: Fibroid tumor of the uterus. Menstruation: Thirty-day type, profuse eight to twelve days flow. This woman was put to bed for five days for observation and treatment and on the thirteenth of November, 1919, supravaginal hysterectomy was performed with removal of the appendix. The next day a thyroid storm developed, her pulse went to 140; her temperature remained normal. This continued for five days and her pulse began to slowly drop. At the end of three weeks she departed for her home, weak and shaky. February 14, 1920, pulse 82, eyes normal. She seemed to be gaining in strength. Later she complained of flushes and weakness and her pulse mounted to 100. There were no eye symptoms, but a return of some of the hyperthyroidia is somewhat disappointing. At her last visit the pulse was 80, thyroid markedly decreased.

Through Dr. W. A. N. Dorland, I am privileged to report another case (No. 3).

CASE 3.—Mrs. R., forty-four, multiple fibroids with hemorrhage. Tachycardia 160; large goiter; exophthalmic, existing since marriage. October, 1916, supravaginal hysterectomy was done. There was considerable tachycardia following a twenty minute hemorrhage. Convalescence slow. May, 1917, the circumference of the neck was one inch less. In the spring of 1919 her pulse was normal and the thyroid gland hardly palpable.

CASE 4.—Mrs. S., aged fifty-four; married; one child. January 22, 1906, was hysterectomized for a large fibroid. At that time she had a goiter which had grown since her sixteenth year. It was of the adenomatous type. She complained of headache, but had no tachycardia; some menstrual pain. As the thyroid continued to grow and became partially intrathoracic, making respiration difficult, she was operated on October 11, 1920. All of the thoracic portion of both lobes was removed, with a part of the isthmus and the upper lobes, leaving sufficient gland to carry on the function.

Using a negative to prove a rule, in this case it is evident that the abnormal growth of the thyroid was stimulated by puberty (it was first noticed at puberty) but the fibroid tumor did not affect the function of the gland, nor did the thyroid subside after hysterectomy, as was observed in the other cases, but continued to grow until operation was necessary, because it obstructed respiration.

Case No. 1 had suffered from hyperthyroidia since puberty, but her condition had grown worse since the growth of the fibroid. Case No. 2 had an exaggeration of thyroid symptoms following each pregnancy. Case No. 3 dates her hyperthyroidism from marriage. Case No. 4 had no hyperthyroidia, but her gland did not diminish after hysterectomy, as did the thyroids of the women who had hyperthyroidism. None of these fibromyomas were reported to be undergoing degeneration.

SUMMARY

As a sex gland the thyroid is influenced by menstruation and pregnancy. The hyperplasia and cell proliferation of the uterus found in fibromyomas may activate the thyroid. The myocardial weakness noted may be due to hyperthyroidism and not directly to the fibromyoma.

It is important to study the function of the thyroid gland in every case of myoma of the uterus. Hyperthyroidism and a damaged heart muscle are serious complications and no operation for fibromyoma should be undertaken without considering these possibilities.

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32 No. State Street.

THE PREOPERATIVE STUDY AND PREPARATION OF GYNECOLOGICAL PATIENTS

By Walter T. Dannreuther, M.D., F.A.C.S., New York

"DID the patient recover? That's the acid test in surgery." Such was the glaring caption appearing in a recent issue of one of our widely circulated medical journals, to advertise the wares of a medical publisher. I wish to register a protest against the acceptance of any such axiom by the modern surgeon, for although it may have been pertinent in the early days of aseptic surgery, it surely must be deemed obsolete now. But if the advertising headline were paraphrased to read, "Were the patient's symptoms entirely relieved? That's the acid test in surgery," it would emphasize the necessity for the stupendous amount of thought, knowledge, experience, and skill that is required to insure real success in operative work, as the publisher intended. Much has been written by acknowledged authorities and specialists regarding the sins of omission and commission on the part of general practitioners in failing to recognize early operative conditions, and also decrying unnecessary and bungled operations by the surgical tyro, but comparatively little has been said concerning the final outcome of the huge number of operations performed by those who are regarded as at least reasonably competent in their respective fields.

All operative cases may be included in either one of two great classes: emergency or elective. Confining further consideration of the subject to gynecology, the assertion may be made that few of our operations are emergency and the majority come within the second category; elective. There is therefore almost invariably ample time for preliminary study and preparation of the patient, and if the gynecologist would be universally successful in his operative work, there is much for him to do besides furnishing the patient with a professional anesthetist and applying his mechanical technic. No one but a hypochondriac is interested in the topographical peculiarities of her pelvic organs, but every one is intensely interested in the backache, leucorrhea, dysmenorrhea, menorrhagia, or other symptoms from which she may be suffering. Consequently, it is obvious that the relief of these disturbances must be reasonably certain, for it is the belief that her ailments will be cured by the operation that induces the patient to submit to it. Any operation that fails of this purpose, irrespective of the anatomic result, is a one hundred per cent failure. The honesty of intention of the gynecologist can be readily assured by his

asking himself and answering affirmatively the following two questions: Am I sure that the patient cannot be relieved in any other manner? Would I urge operation if the patient were a member of my immediate family?

Operating room asepsis and the relatively easily acquired technic have made pelvic surgery so safe that the patient's recovery is no longer a criterion of the operative success. In fact, it might be well if gynecologic operations were a little more hazardous, as the risks involved might then discourage some of the promiscuous operating that is being done. My observations have convinced me that some of us are all too ready to curette uteri and attempt plastic operations especially, without due regard for the ultimate result from the patient's standpoint. According to Sir D'Arcy Power, there are three stages in the career of a surgeon. "In the first he loses the fear of hemorrhage; in the second he ceases to multiply operations; in the third he acquires the moral courage to stop in the middle of an operation when he finds the condition inoperable. There is a final stage which he never attains with the present span of life, the ability to gauge correctly the vital resistance of the patient; yet on this depends the success of every operation." These are trite aphorisms, yet a very important stage has been omitted: the preliminary one in which the necessary training and ability are gained to justify his assuming the responsibility of operative work. And while Power may be correct in his belief regarding our inability to attain the final stage, it certainly behooves us to make a sincere effort in that direction.

If, then, we interpret "operative success" to mean not only the recovery of the patient but also the relief of the patient's symptoms, it is obviously essential that we take cognizance of all those factors that contribute to it. These may be enumerated as follows: (1) the competence of the gynecologist; (2) exact diagnosis; (3) the patient's metabolic capabilities; (4) the preoperative treatment of the patient; (5) a skilled anesthetist; (6) proper operative technic; and (7) the postoperative treatment. When all these items have been accorded due attention, and the operation proves a failure notwithstanding, either by the subsequent persistence of symptoms or the patient's death, then, and then only, can it be truthfully said that we have entirely fulfilled our obligations.

In the process of development of our diagnostic methods, the objective examination of the patient has gradually superceded the history in importance, probably because the modern instruments of precision make it more attractive. Yet, it is just as fallacious to rely upon the pelvic examination alone as it used to be for our forefathers to make snap diagnoses after questioning their patients. In gynecology, particularly, an accurate diagnosis depends upon a thorough itemization

and correct interpretation of the symptom-complex in the basic anamnesis, as well as upon reliable laboratory findings and the objective evidence obtained by the physical examination. While the importance of careful history taking and tabulation of case records is well recognized by many, it is also true that the interrogation of the patient is often carried out in a more or less aimless manner, perhaps without any definite purpose in mind or real comprehension of the significance of the information conveyed by the patient. Throughout a somewhat extensive experience in postgraduate teaching, it has been apparent that many practitioners coming for instruction in special work lack system in their methods. This inherent fault, together with the limited time that a busy physician usually devotes to a single patient, is undoubtedly responsible for many inadequate histories and subsequent diagnostic mistakes. Disturbances of the endocrine glands alone comprise a large number of the problems confronting the gynecologist, and a perfunctory history in these cases is not only useless but may be entirely misleading.

Until the practice of medicine becomes an exact science we all shall be guilty of occasional diagnostic errors, but those of us who confine our activities to one of its special branches must be particularly careful lest we too readily correlate cause and effect incorrectly. The possibility of a remote cause of symptoms should always be borne in mind, and the localization of a symptom in close proximity to some organic condition that deviates from the normal is not conclusive evidence that that particular abnormality is the immediate cause of the symptom. This is well illustrated by the frequency with which operations for the correction of retrodisplacements of the uterus fail to cure sacral backache. A careful analysis of such cases will usually reveal the presence of an associated posterior parametritis, flat-foot, an overloaded sigmoid tugging on its mesentery, a focus of infection in the tonsils or teeth, loose sacroiliac joint, or some other one of the almost innumerable conditions of which sacral backache may also be a manifestation. In fact, so many pelvic symptoms are due to extraneous causes that great care must be exercised in order that we may not be led astray by confining our attention to the pelvic organs exclusively.

History taking is facilitated by noting the events in the patient's life in chronological sequence, and it is therefore easier to systematize the facts if they are obtained by cross-examination rather than as a narrative. This course of procedure precludes allowing the patient to "tell her story in her own words," until the "present illness" is reached, when she may be permitted to describe her symptoms. She will then be so impressed by the character of the record that is being made that she will stick to essentials and forego garrulity. Since the details of certain items may be of importance in one case and not in

another, it would be unnecessarily time-consuming to consider the minutiae of every symptom invariably. Natural progression in eliciting the facts will suggest which manifestations of disease require special attention in each instance.

We must not forget that a woman may assume an alias, misstate her age, and distort the truth, and all cases involving questions of sterility, early pregnancy, and venereal infections should be viewed with suspicion. Many stigmata of constitutional disease are now recognized as hereditary or atavistic in origin, and the family history often demands more than passing consideration. Syphilis, tuberculosis, malignant, circulatory, and renal diseases, menstrual disturbances, and derangements of the endocrine system can frequently be attributed in part to the patient's antecedents, and conversely, the history of the patient's immediate relatives may suggest the likelihood of such possibilities. The exanthemata and their sequelae are important because of their tendency to cause perversions of the internal secretions, especially in the ovary, thyroid, and adrenal. The character and behavior of the menstrual function, together with the existence of premenstrual phenomena, are worthy of special attention, for these are often the signal system of the ductless glands and the indicators of pelvic disease. Yet, of what avail is it to ascertain that the patient menstruates for five days, if we do not also determine whether she uses one or five napkins per day? Or of what value is it to know that the patient is apathetic, mentally depressed, and suffers from morning headache for a few days before each period, if these flying flags are not recognized as manifestations of hypothyroidism? Or why ask the patient if she is constipated, which we expect her to be, if we pay no further attention to the fecal impaction in her sigmoid? And incidentally, the promptness with which many pelvic symptoms disappear after a series of oil and soap suds enemas is sometimes astonishing, despite the persistence of a coexisting pelvic abnormality. How many patients who drink one to two glasses of water, or less, each day have been treated for "cystitis," because the physical properties of a freshly catheterized specimen of urine were unnoticed? And how many patients suffering from chronic pyelitis, ureteral stricture, or urogenital tuberculosis have been treated for "cystitis," because the doctor did not own a cystoscope? These few queries have been made at random, simply to exemplify the variety of detail that may have to be considered.

It is presumed that all those who essay the treatment of gynecologic patients are qualified to determine the condition of the pelvic organs, but unless we constantly regard the woman as our problem rather than her pelvis, our field of vision may become so narrowed that we can see nothing north of the umbilicus or south of the intro-

itus. The physical examination must include the pulse and its rhythm, the blood pressure, the condition of the lymph nodes, and every other factor which may enable us to gain a comprehensive knowledge of the patient's peculiarities and ailments.

Having established an exact diagnosis and then convinced ourselves and the patient that an operation is indicated as the sole means of relief and cure, it is imperative that we anticipate possible complications or a disastrous outcome, by availing ourselves of every resource which may enable us to appraise the vital resistance of the prospective operative patient. For, while we may concur with Power and concede that this cannot always be gauged correctly, modern laboratory aids have now provided several methods by which we may accomplish a great deal toward this end, by acquiring considerable information regarding the patient's metabolic capabilities and abnormalities. Supplementing a careful examination of the heart, lungs, and blood pressure, and the usual urinalysis and blood count, special stress should be laid on acetone and diacetic acid in the urine, the alveolar carbon dioxide tension, renal function tests and the urea content of the urine, the urea nitrogen of the blood, the sugar tolerance of the blood, and the carbon dioxide combining power of the blood.

When operations on old and debilitated subjects are contemplated, these patients should be given a generous and nutritious diet, and encouraged to take large quantities of fluids beforehand, while those who also have a high blood pressure should have complete mental and physical rest besides.

Patients with a hemoglobin of 50 per cent or less, or other evidence of a pronounced anemia, should have a preliminary blood transfusion. The technic of transfusion has now been so simplified that there is no longer any excuse for procrastinating until the patient is *in extremis* after operation.

Acidosis may exist without acetone (or diacetic acid) in the urine, and *vice versa*, and both may occur independently of diabetes. Acetonuria has been frequently observed in postoperative convalescence where it did not appear beforehand, following anesthesia. Since acidosis is usually due to fat and carbohydrate catabolism, where it is discovered clinically, it is often found in patients suffering from intestinal disturbances and malnutrition. Acetone is present in normal urine in minute quantities and traces of it may be disregarded, but when it is markedly increased operations are extremely dangerous and should be postponed if possible. This because diminished hematogenous alkalinity and overwhelming acid intoxication may follow anesthesia. Acetone is easily formed from both food and body fats and carbohydrates, and some observers believe from proteins as well. Early acidosis may be accurately diagnosed by determining the car-

bon dioxide tension in the alveoli of the lungs. The correction of both acetonuria and acidosis demands an increase of alkalies and water.

As a preventive measure, it will be found convenient to prescribe two drachms of sodium bicarbonate to be taken in water half an hour before each meal for three or four days before all operations, whenever feasible, as a matter of routine. All patients are also urged to drink water freely up to within an hour of operation. When acidosis already exists, however, more heroic measures are indicated. A 4 per cent solution of sodium bicarbonate may be given intravenously, or a Murphy drip containing 5 per cent glucose and 2 per cent sodium bicarbonate or potassium acetate in 500 c.c. of sterile water may be given twice a day. The latter is a powerful alkalinizing solution and supplies the patient with a certain amount of nourishment and water. Since Crile has shown that chloroform produces a profound acidosis, ether a less intense acidosis, and gas-oxygen a transitory acidosis, gas-oxygen is usually selected as the anesthetic of choice for operations in the presence of acid intoxication and diabetes.

For many years the urologist has been doing renal function tests and coddling his patients before operation, not because the operations that he performs are especially hazardous, but because such a high percentage of his prospective operative patients are bad surgical risks, on account of the derangements of metabolism and impaired renal function, and should he fail to recognize these abnormal conditions, his mortality would be appalling. Since there is no difference in the biochemical physiologic processes in men and women, why should we be any more negligent in this respect than those whose patients happen to be males? It is quite true that our proportion of poor risks is not apt to be large, but if due care is exercised, many of the bad can be converted into good ones. While renal function tests are utilized chiefly to determine the functional efficiency of the kidneys, they also serve as a reliable index of the patient's metabolic capabilities. The two most in vogue at the present time are indigo-carmine chromo-cystoscopy and phenolsulphonephthalein. The first mentioned I now make a matter of routine before all elective gynecologic operations, because a synchronous bilateral delay indicates the likelihood of nephritis, and a unilateral delay suggests the presence of some surgical condition of the kidney or ureter, which in reality may be producing the symptoms erroneously attributed to coexisting pelvic pathology. When the indigo-carmine is given intravenously, the technic is simple, subsequent elimination is rapid, and conclusions based upon the behavior of the test are reasonably accurate. The phenolsulphonephthalein test, being more time-consuming, will be found efficient in making a quantitative estimation of the patient's

process of elimination, especially after a bilateral delayed ejection of indigo-carmine denotes such impairment of function.

It is almost a universal custom to have the patient bring some of the urine voided on arising in the morning for examination, yet of what use is it to learn that a specimen contains 8 grains of urea and 15 grains of total solids to the ounce, if the number of ounces voided in 24 hours is unknown? One patient may pass 20 ounces and another 50 ounces in 24 hours, so that the urine urea content would be 160 grains in the first instance and 400 in the second; truly a remarkable discrepancy. Admitting that a knowledge of the quantity of urea excreted in the urine is of little practical value unless the nitrogenous content of the blood is also known, a diminution of the urine urea below the minimum normal of 300 grains in 24 hours may still serve as the indicator for the necessity of making a complementary examination of the blood. Many of us probably have a misconception of the clinical picture of uremia, because we have been accustomed to observe it so frequently concomitant with nephritis, and no doubt many old ladies have died after hysterectomy of a uremia that passed unrecognized. I have found it a very easy matter to educate my patients to collect the urine for 24 hours and measure the total quantity. The desired information is then forwarded to the pathologist with a 4 ounce specimen, taken from the bulk collected. It is far easier to make an examination of the urine a matter of routine than a chemical analysis of the blood. A decrease of urine urea below the minimum normal may be disregarded unless the nitrogenous elements of the blood are correspondingly increased. Taking 12 to 15 mgm. in 100 c.c. as the normal urea nitrogen content of the blood, it is evident that the prognosis becomes grave in direct proportion to the retention beyond normal limits. An excess of creatinin in the blood is also a discouraging prognostic factor, particularly in nephritis.

When there is an abnormal hematogenous retention of excrementitious products, occurring independently of nephritis or other actual disease, a great deal can be done towards increasing the patient's vital resistance, by restricting the ingestion of proteins and promoting the elimination of nitrogenous elements. The patient can be encouraged to take mental rest, moderate physical exercise outdoors, a warm bath followed by an alcohol sponge twice daily, deep breathing exercises, a daily enema, small doses of sodium phosphate and Kissingen salts, and liberal quantities of water. The diet may be limited to green vegetables, cooked fruits, cottage cheese, and milk or buttermilk. By these measures, in a woman of 64, with an enormous calcareous fibromyoma of the uterus, which was exerting pressure on the iliac veins and causing edema of the legs, I succeeded in increasing the 24 hour

urine urea from 198 to 306 grains, and reducing the urea nitrogen of the blood from 32 to 19.4 mgm. in 100 c.c. of blood, in six weeks.

The sugar tolerance test of the blood, as a diagnostic and prognostic procedure, is still in its infancy, and no positive statements concerning its practical application and significance can be ventured at this time. It is not unlikely, however, that certain principles based upon its behavior will be formulated in the near future. Incidentally, one should be on the alert that a hyperglycemia is not overlooked, for as much as 0.3 gm. has been found without glycosuria.

The normal carbon dioxide combining power of the blood in the adult varies from 75 to 55 per cent. If this falls to 50, an acidosis may be suspected, and if reduced greatly beyond that point a postoperative fatality may be anticipated.

2020 BROADWAY.

Case Reports

REPORT OF A CASE OF LARGE MENINGOCELE PRODUCING DYSTOCIA. DELIVERY BY PORRO OPERATION

By LINDSAY PETERS, M.D., COLUMBIA, S. C.

OCCIPITAL meningocele as an active obstetric complication is very uncommon and as I am unable to find in medical literature a case of similar proportion, that herewith reported should be worthy of record.

On March 20, 1921, I was called to see Mrs. M. in labor, a para-i, thirty-five years of age. Nothing notable in family history or personal history. Menses began at eighteen years, regular, every twenty-eight days, 4 days, pain in middle of pelvis first two days. Last menstruation, May 15, 1920. No leucorrhea. Married four years. Never previously pregnant. The patient had been free from complications except that at Christmas time she had severe pains in lower part of abdomen, lasting several days. She thought she was about a month overdue at the time of my visit. During the night of March 18, 1921, she went into labor and the membranes ruptured, after which very large quantities of "water" passed from the vagina. The pains, after continuing some hours, subsided. About midnight March 19, 1921, she began to have very severe pains which continued until I saw her for the first time at her home about 4:30 A.M. When I arrived pains had become infrequent and of less severity. I then obtained the foregoing history and noted the following physical findings:

Patient, a broad-framed, well-nourished woman. Heart and lungs normal. The uterine mass appeared to lie uncommonly high in the abdomen, was unusually prominent in the recumbent posture and on palpation was hard, as though the uterine muscles were in tonic contraction. No Bandl's ring felt. Small parts of child were felt at upper pole and the fetal heart heard (144 per minute) to the right and slightly below the level of the umbilicus, but the position of the child was not definitely made out, owing to the rigidity of the uterine wall and the lack of amniotic fluid.

Vaginal outlet nulliparous. Cervix high, external os dilated to 2 cm. in diameter, membranes ruptured. The presenting part, palpated through the partly dilated os, was round and yielding, with a depression in one part. It gave the impression of a marked caput succedaneum, but the skull could not be felt beneath it. As it did not feel like a breech and was too soft for a normal skull, hydrocephalus was suspected.

Pelvic measurements: Interspinous 26 cm.; intercristal 29.5 cm.; bitrochanteric 33 cm.; Baudeloeque's diameter 21.5 cm.; bisischial 11 cm.; diagonal conjugate 12.5+cm. Unable to reach sacral promontory. True conjugate, estimated 11.5 cm.

At 6:30 A.M. patient was taken to the Baptist Hospital. During the day she had uterine contractions of moderate strength at long intervals, but about 10 P.M. I was called to see her on account of severe pains at five-minute intervals. She continued in active labor all night, but at 5 A.M. vaginal examination showed that there was no descent of the head and the cervical os was dilated only to the

size of a dollar. Patient was now anesthetized with ether, the gloved hand introduced into the vagina and the os dilated manually until the fist passed through it with ease. On introducing the hand into the uterus it was now possible to feel the presenting part to be a very large, round, fluctuant bag, which seemed to confirm the suspicion of hydrocephalus. Accordingly this sac was punctured with sharp, curved scissors and a large quantity (not measured) of perfectly clear fluid, drained out. The collapsed sac then came down into the vagina and reached out through the vulval opening and was seen to be covered with hair. This sac was now grasped with Segond's forceps and strong traction made without effecting any descent of the head. Two attempts were then made to apply Tarnier axis-traction forceps to the unengaged head, but each time the forceps slipped off. Still being under the impression that I was dealing with hydrocephalus and that by puncturing it I had removed the obstacle to delivery, and having in mind the unusually large size of the pelvis as shown by pelvic measurements, I decided to desist from further efforts at artificial delivery, feeling certain that the woman would easily deliver herself on again going into labor. With this idea in mind she was returned to her bed. Strong contractions did not begin again until about 5 P.M. She was then again taken to the delivery room and 0.5 c.c. pituitrin given intramuscularly. This was promptly followed by violent expulsive contractions, which were aided by strong traction on the collapsed sac presenting through the vulva. Notwithstanding this and although terrific efforts were made by the woman to expel the child, the head would not engage at the pelvic inlet. This tempestuous contraction of the uterus continued until about 7 P.M. when labor again almost subsided. At 8 P.M. there being no advance of the presenting part and the woman showing signs of beginning exhaustion, it was decided to terminate labor by artificial means. Fetal movements and heart sounds had been absent since puncture of the presenting sac. In deliberating upon the choice of a method of delivery, vaginal cesarean section, craniotomy and decapitation were rejected on account of the high position of the cervix, the inaccessibility of the head, the apparently large size of the child, the incomplete dilatation of the cervix, the smallness of the vagina and the unusually firm, resistant perineum.

Low-incision, transperitoneal, abdominal hysterotomy was chosen as the most suitable procedure and, on account of the probability of infection due to repeated vaginal examinations and the intrauterine operation which had been necessary, it was deemed advisable to suture peritoneal flaps turned back from the vesical reflection and adjoining lower uterine segment to the edges of the incised parietal peritoneum, thus making the delivery extraperitoneal. Morphine sulphate gr. ¼ and atropin sulphate gr. 1/150, were given by hypodermic at 8:30 P.M. When the anesthetic (ether) was begun about 9 P.M., pituitrin, 0.5 c.c. and ergotol, 20 minims, were given intramuscularly. The vagina and cervix were thoroughly swabbed with iodin.

Operation was begun about 9:30 P.M., March 21. Median incision from symphysis pubis upward about 11 cm. Emptying the bladder before operation was overlooked and this organ, extending high above the symphysis, was accidentally opened by a minute incision and immediately closed by a double row of continuous catgut sutures. On opening the peritoneal cavity in Trendelenburg posture, the bladder could be easily held out of the way with a large retractor, exposing the anterior surface of the uterus. The vesicouterine reflection of peritoneum was incised transversely and folded upward and downward, so as to form upper and lower peritoneal flaps, beneath which lay the denuded anterior surface of the uterus. After separating the bladder from the upper portion of the cervix these peritoneal flaps were sewn to the edges of the incision

in the parietal peritoneum, in this way shutting off the peritoneal cavity from the field of operation. A vertical incision was now made through the anterior surface of the cervix and lower uterine segment and when the incision opened the uterine cavity there was an escape of gas and yellow meconium, resembling the feces of an infant some days after birth. This was sponged away and the incision extended to the desired length, thus bringing into view the head of the dead infant, lying in right occipitoposterior position, whose scalp was seized with Segond's forceps and a head, the skull of which was now for the first time found to be of normal size, was easily delivered, followed by the large collapsed sac which was now seen to be, not a hydrocephalus, but a meningocele springing from the occiput and nape of the neck. The rest of the fetus was then delivered without difficulty. The placenta was easily detached and delivered and up to this point there had scarcely been any bleeding, but the uterus remained flaccid notwithstanding the oxytoxics given hypodermatically just before operation and irritation of the uterus by rubbing its inner surface with a towel. Suddenly there was a gush of blood from the uterine cavity, which was not controlled by packing the uterus with a soft towel, hence the line of union of visceral peritoneal flaps and
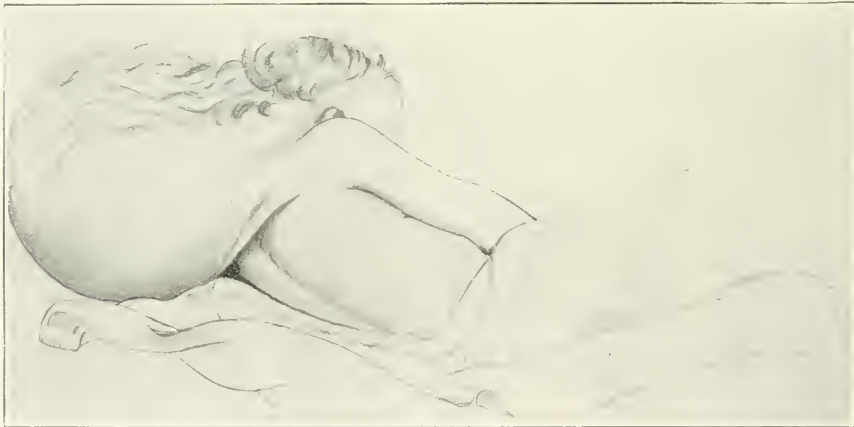
Fig 1.—Drawing after photograph showing meningocele sac filled.

parietal peritoneum was quickly torn through and the body of the uterus brought up through the abdominal incision and a strong rubber tourniquet thrown around it as low down as possible. Clamps were applied to the broad ligaments and a supravaginal hysterectomy was done in the usual manner. An iodoform gauze drain was pushed down through the dilated cervix, the upper portion of the drain covering the raw surface of the amputated cervix. After uniting the parietal peritoneum by continuous catgut suture the remaining layers of the wound were brought together by through and through, interrupted silkworm gut sutures.

A selfretaining catheter was placed in the bladder and the patient then returned to her bed with a pulse rapid, but of fairly good volume. After the frightful hemorrhage she had become pulseless, but by prompt transfusion with salt solution her condition was improved.

About two hours after operation the patient became conscious and the next morning she asked for food. There was no nausea. She showed marked anemia and her pulse and respiration were rapid, but there was no special discomfort until the evening, when she first mentioned a pain in the lower part of the left side of the chest in front.

During convalescence there were signs of pneumonia of very short duration

and suppuration of the wound with separation of its edges in the upper two thirds. This was promptly cleaned up by the use of Dakin's solution and dichloramine. By the twenty-seventh day the wound had sufficiently closed by granulation to permit the patient to get up in a rolling chair and two weeks later, at her request, she was discharged from the hospital and continued to have the wound dressed at my office. Before the wound had healed the scar and granulating tissue were excised and the wound resutured, resulting in good firm union and linear scar.

Unfortunately the infant was not weighed and no measurements were taken. It was a male and appeared to be of about the average size of a full term child.

The meningocele was not pediculated, but was attached by a broad base over the occiput and the back of the neck. On splitting its sac down to the skull its cavity was found to communicate with the cranial cavity through an elliptical opening in the midline of the occipital bone, having its lower extremity about 1.5 cm. above the foramen magnum and measuring 3 x 2 cm. Through this opening the cerebellum was visible. There was no spina bifida or other deformity than the meningocele, except a flattening or depression of the occipital bone due to pressure of the fluid in the tumor.

Before splitting the meningocele sac the rents and punctures in it were closed by ligation and its cavity filled with water in order to determine its capacity, which was found to be two liters. Some idea of the proportions of the tumor is obtained from Fig. 1.

After searching the literature easily available, including the files of the *Journal of the American Medical Association* and the *American Journal of Obstetrics* back to 1900, I find only one other reported[1] in which the size of the meningocele approaches that of my case: The tumor in that instance, judging from the illustration accompanying the report and from the fact that it permitted an uncomplicated birth of the child, must have been of smaller size than the one described in the present report.

In an article on the "Course of Delivery with Occipital and Dorsal Meningoceles," abstracted in the *Journal of the American Medical Association*, 1913, lxi, 1755, from *Beiträge zur Geburtshilfe und Gynaekologie*, 1913, xvii, No. 3, 307-446, Kroner reviews eighteen cases: in ten there had been deflexion presentation and this group he summarizes in detail. The data show that occipital meningoceles frequently entail frontal or face presentation; sometimes a transverse face rotates around the symphysis. With a meningocele at the back of the neck, presentation generally occurs as a deflexion presentation; delivery can occur only by a change to occipital presentation.

Certain Italian observers have found evidences of parental syphilis almost invariably in carefully investigated cases of congenital hydrocephalus. Having this in mind, a Wassermann test was made on the blood of the mother in our case, with a negative result.

REFERENCE

(1) *Boyd*: Am. Jour. Obst., 1906, liv, 184.

1211 GERVAIS STREET

LATERAL PARTIAL GLANDULAR HERMAPHRODITISM

By J. F. Baldwin, M.D., F.A.C.S.. Columbus, Ohio

IN THE May, 1921, issue of the American Journal of Obstetrics and Gynecology, Dr. Charles W. Moots, of Toledo, reports a very interesting case under the above caption. The rarity of these cases justifies the report of each one, and for that reason I report my case, particularly as the time which has elapsed since my operation adds an important feature. The unfortunate death of Dr. Moots' patient so soon after her recovery renders the final result somewhat uncertain, though apparently a complete transformation, as in my case, would have taken place in due time.

Miss X., aged thirty, consulted me October 25, 1904. General health excellent. Had never menstruated. Appetite good, bowels regular, kidneys normal. Patient stated that she had no vagina, and that there was a peculiar fleshy growth connected with the vulva. Since puberty she had had a coarse voice and had developed a good deal of hair over the body and face. All her habits and inclinations were strictly feminine. There was a pretty clear history of a menstrual molimen. She had never been examined by a physician. Patient a brunette with a semi-masculine voice. She was slightly below the average in height, but was plump, with hands short and thick like her body. Marked growth of hair over the entire surface, with a heavy development on the pubes, but feminine in distribution. Breasts well developed but rather smaller than would be expected in a woman of her build. There was a greatly enlarged clitoris, this being an inch and a half long, and terminating in a typical glans with a well developed foreskin. Underneath the clitoris I finally located a small opening which would just admit the tip of the finger. Under an anesthetic I introduced the finger, and then found a normal vagina with an infantile uterus. The perineum had simply grown forward so as to practically close the vaginal inlet.

The case seemed to be one of mixed sex elements, but with a predominance of the female. I advised a plastic operation on the perineum to open the vagina, removal of the hypertrophied clitoris, and an abdominal operation to correct any pelvic pathology which might be present.

The abdomen was opened first, the incision going through about two inches of fat. An infantile uterus was found, on the left of which was a normal tube and ovary; no corpus luteum but several cysts. On the right side the tube was smaller, and here there was present a nearly globular body suggesting a testicle rather than an ovary. This body was removed. Appendix removed. Gall bladder normal. Incision closed as usual.

Patient was then placed in the lithotomy position and the enlarged clitoris amputated in the usual way. The perineum was split back the proper distance, some tissue resected, and the mucous membrane and skin brought together so as to make a practically normal opening. The hymen was normal except as it had been torn by the previous examination. Urethra normal.

The patient made an ideal convalescence and was married a few months later. I have seen her repeatedly since that time, and she assures me that she is "the happiest woman in Ohio." She has adopted several children, so that she has a family. Her voice and general appearance have so changed that nothing abnormal would now be noticed.

The pathologist reported that the suspected tissue was a testicle, and it was its presence that was doubtless responsible for the male elements which had been present in her case.

In 1904 we had heard very little of the functions of what we now know more about as the endocrine glands, but the following case is of interest in connection with the one reported above:

Miss H., aged fifteen, a school girl, September 26, 1904, was brought in by her physician and parents. Previous to her present illness she had been a sweet pleasant girl, the baby of the family. Was slender in figure, weighing about 100 pounds. Had menstruated twice, nine months and eight months before the consultation. The flow had lasted but a single day and was very slight, probably not more than a teaspoonful. No symptoms preceded these two periods, and at the succeeding months there was no molimen. Four months before my consultation it was noticed that her voice became coarse like that of a developing boy. A month later acne developed on the face, and also a growth of hair over the face and body, most noticeable on face, arms, back and shoulders. With this there occurred a marked change in her disposition. She had previously enjoyed being with girls and had never cared for boys, but with this change she wanted to be by herself and was peevish and irritable. On examination I found her a plump girl, weighing about 140 pounds. The hair on her face was like that of a boy of her age, and the same condition as to the hair on her body and extremities. The breasts moderately developed but not as large as would be expected in a girl of her weight. Voice like that of an adolescent boy. Examination showed normal development of hair on the genitals; the major lips well marked, the lesser lips slightly marked; clitoris greatly enlarged as in the previous case, the glans well marked and fissured so as to resemble closely a urinary meatus; the whole organ very suggestive of a penis; urethra normal; normal hymen; the vagina seemed smoother than usual but of normal length; could make out a small cervix, but because of the tenderness could make out nothing more.

There was no improvement in her condition and on November 5, largely because of the findings in the previous case, I operated. The clitoris was amputated in the usual way. There was an infantile uterus as expected. Fallopian tubes normal. The ovaries were represented, however, by masses about the size of the last joint of the little finger. No evidence of any follicles in the tissue of these glands. Both of these masses were removed, and on section seemed testicular, but I have no report from the microscopist as to his findings.

Patient made an excellent operative recovery. September 27, 1905, her physician reported that she was no better; was very fat, weighing about 250 pounds, and perfectly helpless; he had been giving her thyroid extract but without benefit.

October 13, 1905, her physician reported that she had died that day of typhoid fever. Autopsy refused.

115 South Grant Avenue.

REPORT OF A CASE OF INTERSTITIAL PREGNANCY

By K. Sellers Kennard, M.D., and R. Emmet Walsh, M.D.,
New York City

THE case here reported occurred on the First Surgical Division of Fordham Hospital, New York, from whom permission to publish the clinical and surgical aspects was obtained and to whom acknowledgment is given.

CASE REPORT.—Mrs. K. W., age thirty-eight, German, housewife, admitted to Fordham Hospital, Nov. 7, 1920.

Chief Complaint.—Pain all over abdomen and extreme weakness.

Family History.—Father died at fifty-four of acute pulmonary tuberculosis. Mother at sixty-seven, cause unknown. Four sisters alive and well. History of pelvic trouble in female side of family: one sister had two successive miscarriages without any subsequent fecundation. Another sister had a double oophorectomy.

Menstrual History.—Began at fourteenth year, regular twenty-eight day type, moderate in amount and of 5 days' duration, dysmenorrhea always present, accompanied by headache, vomiting, etc. Last period Sept. 26, 1920.

Marital History.—Married the first time in 1903. She did not become pregnant during first seven years of her married life though no effort was made to prevent conception. In 1912, two years after an operation for retroflexion, she became pregnant and was delivered at term of a girl baby, breech presentation. Her husband died in 1914 and patient remarried in 1917. She became pregnant for the second time in September, 1920.

Habits.—Appetite, good. Bowels, somewhat constipated. Urination, no dysuria, nocturia, oliguria or polyuria. Venereal, denied by name and symptoms. Drugs, denied.

Present Illness.—Patient was perfectly well until Nov. 6, 1920 when she experienced sudden sharp pains in her lower left abdominal quadrant. She became pale and hurried home from her shopping tour. She took a drink of hot, black coffee and felt relieved after an hour or two. She did not faint or notice any spotting. That same evening she felt well enough to go to the theatre and the following morning felt well on awakening. Ten minutes later she was suddenly attacked with sharp, knife-like pains in the lower left abdominal quadrant. These pains grew worse and "radiated up to her heart." She looked deathly pale and vomited greenish fluid several times. Her doctor, arriving two hours later, found her in deep shock and administered morphine gr. ¼ and whiskey and coffee enemata, and adrenalin hypodermatically.

Physical Examination:—General appearance that of internal hemorrhage, eyes react equally to light and accommodation, heart and lungs normal, pulse rapid, regular and feeble. Liver, kidneys and spleen not palpable. Rigidity and tenderness present throughout abdomen. Extremities normal. Reflexes normal. On admission T. 96°, P. 130, R. 28.

Preoperative diagnosis, ruptured uterus.

Operation.—Nov. 7, 1920 by Dr. Walsh. Open ether narcosis. Low median incision. Peritoneal cavity filled with recent blood. Fetus of three months' size found immediately beneath peritoneal opening with umbilical cord leading down to a wound in the summit of the uterus midway between the fundus and the left cornu.

Digital examination disclosed a cavity the size of a large walnut containing placental remains still attached to the umbilical cord. Placenta and fetus removed and the wound in the uterus closed in two layers with plain gut No. 2. Tube drain from site of uterine laceration. Abdomen closed in layers in the usual manner, plain gut throughout.

During the progress of the operation an intravenous injection of saline (500 c.c.) was given with apparently very good result. Patient returned to ward, pulse 96, respirations 32, at 4:30 P.M. Died at 9:55 P.M., Nov. 7, 1920.

Autopsy performed November the eighth, at 10:20 A.M. Peritoneal cavity contains a quantity of clotted blood. Other than a general paleness of the organs, unilateral dilatation of the uterus was the only feature of note presented by gross examination of the pelvic organs.

The vagina was normal in all respects, and no old or recent injuries were present. Examination of the uterus shows that there is a dilatation of the left cornu, involving principally the posterior wall, and that the outer wall of this protruding area is considerably thinner than the normal uterine muscle wall. Measurement of the organ shows its greatest length four and three quarter inches, greatest transverse diameter three and three-quarters inches. The protruding area occupying the
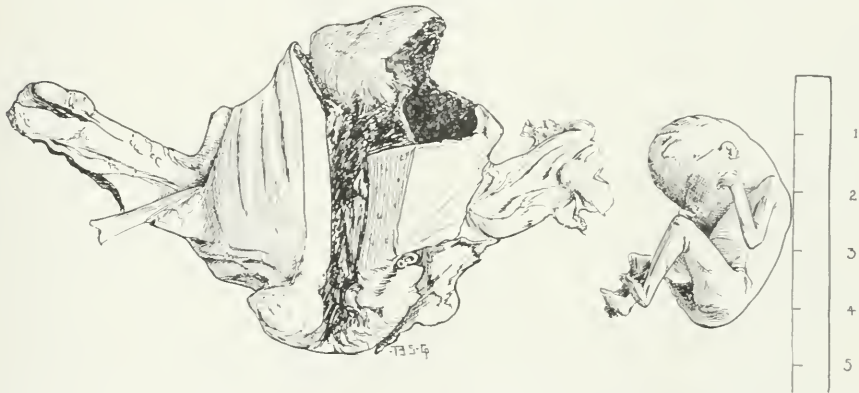
Fig. 1.—Composite diagram made from several photographs, showing uterus with site of rupture and size of fetus.

left cornu proves to be a sac unconnected with the uterine cavity and formed out of the muscle wall of the fundus of the uterus. The left fallopian tube appears to be inserted into the sac, about the middle of its lower portion, though a probe passed into the lumen of the tube does not enter either the cavity of the sac or the cavity of the uterus, but impinges against an obstruction, apparently muscle tissue. No definite *pars uterina* of the tube can be made out, and if the sac had its origin in this part of the tube the relations of such are no longer appreciable. The extrauterine portion of the tube is normal in size, relation and appearance. The muscle wall of the fundus of the uterus appears to be the portion of the organ out of which the sac was formed.

With the parts in apposition, the sac measures four inches in its longest dimensions, making some allowance for twelve hours' fixation in five per cent formalin. Its appearance was as if the uterine wall had been split into two layers, one forming the outer and the other the inner wall of the sac. The internal appearance of the cavity of the sac shows the muscle trabeculated and resembles the interior of the cavity of the heart. Numerous blood clots were attached to the wall and entangled in the drawn out muscle bundles.

The rupture had taken place posteriorly. It was irregular in outline, with

ragged edges and measured two inches in length. The tissue about the edge of the tear, both externally and internally, was deep purple in color. While the placenta had been removed at operation, it is most probable that the area of discoloration on the inner surface of the sac, about the tear, marked its location, and the wall of the sac was distinctly thinner at this point than elsewhere. The greater dilatation of the sac lies toward the midline of the uterus, and probably accommodated the head of the fetus, as is shown in the plate. As stated, there was no communication between the sac and the uterine cavity. The internal os was tightly closed; the cervical canal of normal caliber and the external os admitted the end of the little finger.

The left ovary contained a body which measured three-quarters of an inch in diameter, and was composed of two zones; an outer, grayish-white in color, measuring a quarter of an inch in width and the periphery of which, in one locality, contained a small clot of blood; the inner, formed by a cavity cup-shaped in character, one-half an inch in diameter, contained a viscid, clear fluid and was lined with a white, glistening membrane. The right ovary contained a number of unripe graafian follicles. The peritoneum covering the internal genitalia was normal in appearance.

The endometrium was greatly swollen, had undergone hyperplasia and was hemorrhagic in appearance. Numerous blood clots, and strands of tissue presenting a membrane-like arrangement, were present on the surface of the mucosa. Scrapings from this locality were examined microscopically, and found to consist of blood, desquamated epithelium and characteristic decidual cells, large in size and plentiful in quantity. No chorionic villi were present. Scrapings from the wall of the sac were fixed by heat upon a slide and stained with hematoxylin and eosin. Large epithelioid-like decidual cells in great numbers were present, as were chorionic villi, blood cells and strands of fibrin. The uterine wall is normal in appearance, no marks of instrumentation were found anywhere in the genital tract. A section of the uterine wall removed for microscopic examination showed nothing abnormal. Increase in size of the muscle fibers and mitosis of the nuclei, changes incident to pregnancy, were present, but nothing that could be construed as a pathologic process could be observed by microscopic examination.

The fetus, a male, presented no abnormalities of development and, from its measurements, was in the twelfth or fourteenth week of gestation.

1932 ARTHUR AVENUE.

FURTHER EXPERIENCES WITH A NEW METHOD (ASPIRATION AND PRESSURE) OF TREATING MAMMARY ABSCESSES. AN ILLUSTRATIVE CASE

BY JOHN PATERSON GARDINER, M.D., F.A.C.S., TOLEDO, OHIO

SINCE my first report* on this new method of treating unopened mammary abscesses, further experience has confirmed the results given at that time and moreover the method has proved equally as successful in the treatment of opened as of unopened breast abscesses.

The technic as previously described is simple. The lymphangitis of the breast is combated by pressure, thus preventing an extension of the infection and causing a localization of the process. When localization has occurred, the pus is aspirated and the pressure reapplied. The second aspiration follows in from four

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to six hours and the amount of pus obtained at this time determines the frequency of the succeeding aspirations. After each aspiration the pressure is immediately applied.

The improved method of applying the pressure consists of placing over the entire breast a few layers of sterile gauze, the breast is covered by a sterile towel folded four ply, a clean deflated basket-ball bladder is spread on top over the breast and is held in position by a three inch roller bandage. To minimize the discomfort, the bladder should be inflated by degrees up to the desired pressure. Sufficient inflation can be readily accomplished by blowing in the tube of the bladder, the end of which is covered with a piece of sterile gauze. The pressure is later adjusted to suit the needs in the case.

Nursing from the affected breast may begin four or five days after a dry tap in those breasts in which lactation is just beginning, but in those of the late lactation period nursing is interdicted as the milk supply is already insufficient. The pressure is continued for two or three days after a dry tap.

The method of treatment is as satisfactory in opened as in unopened mammary abscesses. The following illustrative case is cited because the breast had the appearance of requiring through and through drainage as the only method which would satisfy the surgical requirements, but with the aspiration and pressure treatment, without an operation and with no scar there was a complete recovery in four days.

Mrs. B. had nursed her child for six months. The nipple was sore, fissured, and bled on nursing for several days before a red tender lump was noticed in the outer, upper quadrant of the right breast. The mass increased, a poultice was applied, and the breast was lanced. When I saw the patient, the temperature was 103° F. and the breast was dark red and swollen to twice the size of the opposite breast. Pressure as above described and heat were applied. During the night there was a little discharge and the swelling was greatly reduced. The outer and lower regions of the breast were indurated but no fluctuation was felt. The needle of a syringe containing one-half per cent novocain solution was inserted into the original incision and the contents injected deeply into the breast. The needle was withdrawn and a larger needle was inserted to which a syringe was attached and 100 c.c. of pus was withdrawn. The pressure was applied according to the technic described. In four days after the breast was first seen there was a dry tap and recovery was complete.

This treatment of mammary abscesses is efficient and simple. There is no scarring and the patient need not be confined to bed. The success of the treatment depends upon keeping the surface area of the pathologic tissue limited to a minimum by emptying the cavity of pus frequently and by the continued pressure preventing the water logging of the tissue cells.

COLTON BUILDING.

RECURRENT ABDOMINAL PREGNANCY

By W. H. CONDIT, B.S., M.D., F.A.C.S., MINNEAPOLIS, MINN.

From Department of Obstetrics and Gynecology, Medical School, University of Minnesota

MRS. R. T., age 27, admitted to the hospital April 8, 1920, with diagnosis of acute appendicitis complicating a six months' pregnancy. Last menstruation October 28, 1919. Patient first noticed pain in her left side in December, 1919, and was in bed until February 9, 1920, when she was told by the attending

physician that she had inflammation of the uterus. Pain at that time was very severe. Patient was unable to lie on left side, lost weight and strength rapidly. Lower abdomen was very tender and upon getting about again, she gained weight. and strength quite rapidly, but the dull, aching pain persisted in the left lower abdomen.

Fig. 1.—Anterior view of fetus from first abdominal pregnancy.

April third, pain was more severe on the right side and at this time on consultation, the diagnosis of appendicitis was made. Pain on the right side was steady, dull in character, not affected by the ingestion of food or by position, was worse at night, but did not interfere much with her sleep.

Patient married six years ago and lived with first husband two years. Two years later (1918) she married again. The patient had two miscarriages by the

Fig. 2.—Fetus from second abdominal pregnancy, in the same patient fourteen months later.

second husband, both two months' gestation. Patient always had regular twenty-eight day menstruations since the beginning at the age of thirteen. No dysmenorrhea, no amenorrhea, except during pregnancy. Her maximum weight was 125 pounds, at present 114 pounds. Her blood pressure was 130, over 70. All other functions and organs normal.

Blood examination shows hemoglobin 58 per cent; leucocytosis 13,280; poly-nuclears 84 per cent; Wassermann negative. Vaginal examination negative for any infection.

The x-ray examination revealed a clearly defined fetus of at least six months' gestation. The cervix was soft, admitted one finger and posterior to the cervix was a mass which filled the whole pelvis. To the right of this was a smaller mass about the size of a slightly enlarged uterus, which was diagnosed as an appendiceal abscess. It was finally decided that this was the fundus of the uterus and that we had an abdominal pregnancy to deal with. Fetal heart sounds were heard in the right lower quadrant.

The patient was treated expectantly, confined to bed for one week. On the last day she no longer felt fetal movements, which up to this time were very perceptible. We could no longer hear the fetal heart. She was allowed to gradually get about and finally dismissed from the hospital with instructions to lead a sedentary life and report immediately on occurrence of any acute abdominal pain or show of blood from the vagina.

On May 25, 1920, patient came to my office with a show of blood from the vagina but no symptoms of any severe hemorrhage, or of any intraabdominal bleeding. She remarked that she was ready for operation, as she was becoming tired of her constant abdominal distress. Operation, May 25, 1920, midline incision, anticipated finding an abdominal pregnancy, uterus crowded under right side of symphysis pubis, and the macerated fetus, (Fig. 1) was still in the amniotic sac. The amniotic fluid was of a greenish yellow color. The fetus was removed and an unusually large placenta for the age of conception was found attached deep in the pelvis and extending over the left side nearly to the crest of the ilium. Any attempt to loosen the placental tissue was accompanied by profuse bleeding, as no attempt by nature had yet been made toward degeneration of the attachment even though the fetus had been dead four or five weeks. I stitched the peritoneum to the border of the amniotic attachment to the placenta, thus walling off the upper peritoneal cavity, leaving a drainage opening the size of my fist. The placenta gradually sloughed out and at the dressings, reminded one of a miniature volcanic crater, throwing off steam and debris, as the process of fermentation produced gases that seemed much warmer than body temperature.

After four weeks, the pelvis was cleared up and the patient made a rapid recovery without a rise of temperature of more than one degree above normal. She regained her normal weight, and went about her usual duties since the eighth week following the operation. There is, as yet, no evidence of any weakness in the area of the wound where the drainage was instituted and the uterus has resumed its normal position. Needless to say, the left tube and ovary were destroyed in the development of the fetus and the pregnancy was doubtless primarily tuboovarian.

The interesting features of the case are: Absence of severe pain in the left adnexal region, it being more marked on the right; also, absence of any hemorrhage from the uterus during the progress of development in the tube, or any symptoms of any interabdominal hemorrhage.

Patient returned to work ten weeks following the operation and continued to attend to her regular duties in excellent health up to the first of May, 1921, when she began to suffer from nausea, abdominal distress, and inability to take food other than bread and milk.

She had a menstruation the first week in May, no menstruation in June and flowed for two weeks in July. She consulted me for this abdominal distress and the loss in weight. Patient at this time denied any possibility of a pregnancy,

so our attention was directed to the abdomen, fearing some intestinal obstruc-
tion due to the adhesions attending the previous operation.

Fluoroscopic examination shows a rather dilated cecum, but no evidence of
any obstruction. Her blood picture at this time showed hemoglobin 78 per cent; red
cells 4,000,000; leucocytes 11,200; polynuclears 83 per cent.

The day following the fluoroscopic examination, the patient admitted the pos-
sibility of a pregnancy and on pelvic examination, a large cystic mass was found
filling the whole pelvis, very tender on palpation, the uterus in anterior position
size of a three months' pregnancy.

Diagnosis made of a possible abdominal pregnancy. She was operated the
thirtieth of July and a three and one-half months' fetus was found intact in
its membranes (Fig. 2). Cutting into the old scar, in which was a ventral hernia
the size of an English walnut, we opened a cavity filled with old blood, walled
off from the general peritoneal cavity. There was a marked separation of the
placenta and upon relief of the pressure in this cavity, free hemorrhage occurred
immediately. The amniotic sac was then opened and the fetus delivered, to-
gether with the part of the placenta that was separated. The placenta was
attached to the parietal peritoneum on the left side and spread over a surface
much larger than one would expect at this period of gestation in the uterus.
Hemorrhage was most severe and the cavity was packed with a five yard roll of
gauze. On the third day this packing was removed and no further hemorrhage
resulted.

The patient at the present writing (eight days postoperative) is convalescing
perfectly, with free bowel function and eating well. The condition of the
organs in the abdomen was such that it was impossible to determine without
dissection and severe hemorrhage, whether either fallopian tube was functioning.
The right tube was in evidence but involved in the wall of the tumor.

Patient made a complete recovery.

NICOLLET CLINIC.

Society Transactions

(Continued from November issue.)

Dr. Sidney A. Chalfant, of Pittsburgh, read a paper entitled **Torsion of the Cecum, with Review of the Literature and Report of a Case.** (For original article see page 597.)

DISCUSSION

DR. EDWARD A. SCHUMANN, Philadelphia.—In order to save time, I will not touch on the very interesting clinical aspects of this condition, but direct attention very briefly to some of the causative factors underlying its production. I believe that in these extreme mobilities of the upper colon there is always an arrest of development. In the first two months of intrauterine life there is present a funnel-shaped cecum and unrotated funnel-shaped openings. In cases in which the colon remains unrotated and mobile, there results an arrest of development of the gut in adult life. In the great bulk of cases, with marked mobility and failure of rotation of the colon, there is associated, on careful examination of the patient, some other evidence of arrest of development. In Dr. Chalfant's case there was present a mammalian bicornate uterus; in other cases there are noted characteristic mammalian teeth. These patients apparently then have certain atavistic tendencies. Other causative factors are well-known changes in the mesentery involved in the assumption of the upright position on the part of man. We also know that in the assumption of the upright position the mesentery, particularly the mesocolon, is compelled to support the weight of the descending colon, and in many cases the development of increased connective tissue and elastic tissue in the mesentery has not kept pace with the weight of the colon. I believe that is the chief cause of the frequent condition of ptosis and large, heavy bowel. Microscopic sections of a number of autopsy specimens of people dying of intercurrent diseases, who had ptosis of the colon, showed this distribution of the elastic and connective tissue of the mesentery. A contrast of this with the mesenteries of quadruped mammals, furnishes an interesting picture. There the mesentery has no connective tissue as it does not need it; there is no weight upon it.

Dr. Harold C. Bailey, of New York, read a paper written in collaboration with Dr. Halsey J. Bagg on **Vulval and Vaginal Cancer Treated by Filtered and Unfiltered Radium Emanation.** (For original article see page 587.)

DISCUSSION

DR. FREDERICK J. TAUSSIG, St. Louis.—I think the work Dr. Janeway and Dr. Bailey have done in the use of emanations in these cases is valuable. So far as the treatment of vaginal cases is concerned, I quite agree with this method. I think, however, when it comes to vulval cases we must again analyze in what way radium is to displace surgery. Vulvar cases are more general in their indications

than breast cancers because they metastasize early in the disease and accessibility to the primary lesion without surgery in the main is to be preferred. One group, however, I believe should be handled by radium, that group in which we have either cancer of the urethra or cancer of the clitoris close to the urethra, and in order to accomplish surgical excision it is necessary to remove a portion of the urethra. Anyone who has handled some of these cases for years afterward and replaces the function of the lost urethra knows the patient had better take her chances with radium than with surgical excision of the growth, because in radium treatment the function of the urethra is usually not lost. However, in all cases where the lesion is well away from the urethra, where surgical excision can be made widely, it is preferable to adopt it rather than radium. However, radium should be used in addition. It should be used before the excision to prevent implantation metastases, or as a prophylactic measure over the glandular region.
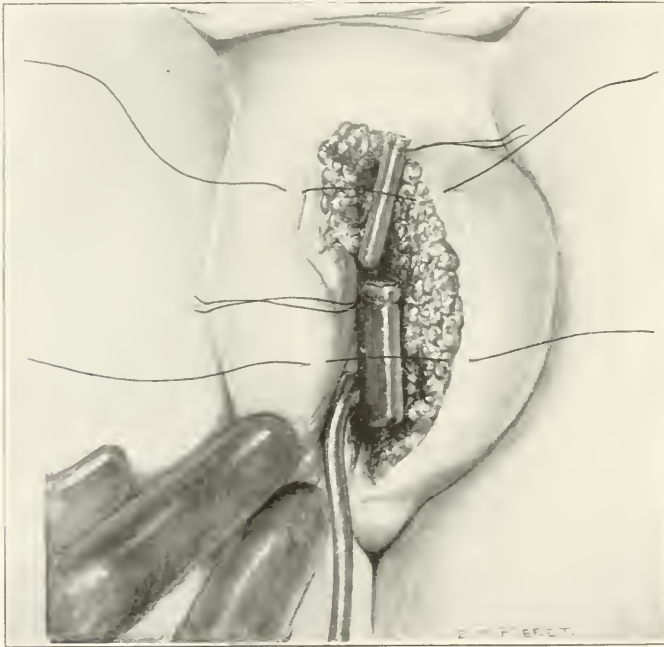
Fig. 1.—Dr. Ward's case of carcinoma of the vulva showing method of applying the radium tubes.

DR. GEORGE GRAY WARD, JR., New York City.—I show here some illustrations of a case of carcinoma of the vulva that occurred in our service at the Woman's Hospital as illustrating the effect of radium and the method I used in employing this aid. The tubes screened with brass and rubber were placed *in situ* (as shown in Fig. 1) with sutures, a catheter being introduced into the bladder previously to permit urination to go on.

While the radium destroyed the disease locally, she survived only about six months, dying from metastases.

DR. FLOYD E. KEENE, Philadelphia.—I have recently had occasion to follow up the cases of carcinoma that were treated by radium in Dr. Clark's service at the University Hospital. Of a total of 313 we have had 19 malignant cases involving vulva or vagina, not including 6 cases of carcinoma of the urethra. Of these 19 cases, 2 were chorioepitheliomata. The other 17 were cases of carcinoma of the vulva or of the vagina. The cases of chorioepitheliomata were radiated and are

alive and well between five and six years after the application of the radium. Of the cases of carcinoma or epithelioma of the vulva or vagina that are living, we have had four. Of that number, one is alive and apparently well. One is alive two and a half years afterward, one, one and a half years afterward, the third about three years afterward, and the fourth, four to five years afterward.

Among the fatal cases, of which there are thirteen, three had rectovaginal fistula. We have not had access to the large amounts of radium, such as Dr. Bailey has used, and our work has been limited to 100 milligrams of radium element, applying the radium in capsules or implanting it into the growth by means of needles. It is very essential for one to use extreme care in treating carcinoma of the rectovaginal septum. First, because of the immediate symptoms which may result, such as a proctitis or cystitis, and secondly, because of the danger of fistula incident to the destructive action of radium. Of the 17 cases of epithelioma of the vulva or vagina, we have had 3 fistulæ. In 313 cases 1 followed up, including all cancers, we have had 31 fistulæ. The incidence of fistula following upon radiation of epithelioma of the vagina is greater than that in carcinoma of the cervix or of carcinoma situated in other parts of the pelvis.

I should like to ask Dr. Bailey his opinion regarding primary excision of cancer, as well as the glands, with subsequent radiation.

DR. HAROLD C. BAILEY, (closing).—My views are quite in accord with those of Dr. Taussig in regard to urethral cancer. In one case the treatment is detailed. The woman had a carcinoma of the urethra, with an ulcer about one centimeter in diameter and splitting the meatus. She had also glands in the groin that were involved. That ulcer disappeared without any discomfort to the patient, and without any urinary trouble whatever, with the application of 8 tubes of nearly a millicurie each. Five months afterwards, as a prophylactic measure, the tubes surrounding this area were embedded two-tenths of a centimeter apart. The glands in the groin became larger and were then dissected out and tubes embedded in the area a centimeter apart, and at that time, which was nearly a year after treatment, further radiation was put in the nodular mass, which was one centimeter from the meatus. That patient then apparently was quite well. She was shown at a conference several months later and disappeared for five months. She again appeared the first time with the original lesion in full active sway. It is a rather interesting case.

As regards the use of tubes where only a small amount of radium is obtainable, I think the method brought forth by Dr. Ward is very ingenious, and we are in the habit of using radium laid directly against the lesion. We have never seen anything approaching a cure.

As regards the question of removing the local lesion by surgery rather than by radium, the point we wish to bring out in this paper is, that it can be readily done so far as we can see without any loss of tissue and without any sloughing. There is secondary contraction of the tissues coming on some eight or nine months later, but there is no loss of tissue and no sloughing. The only time when sloughing occurs is where a case is re-treated and tubes are embedded in the area in which the radium was previously placed.

DR. HENRY T. BYFORD, of Chicago, read a paper on **The Cure of Cystic Cervical Endometritis by the Aid of Multiple Scarifications.** (The following is the author's abstract. Paper published in full in the Society's Transactions for the current year.)

Cystic degeneration of the cervix is curable only by a destruction of the degenerated glandular tissue. When it is limited to a small part or parts of the

vaginal portion the desideratum is to destroy only the cysts and degenerating glands. Cutting operations and cauterization destroy too much functionating mucous membrane, while the ordinary local treatment consisting of puncture of follicles as they develop and the application of the tincture of iodin is seldom curative. The author employs a modification of this local treatment that makes it curative. Instead of using the ordinary lance pointed uterine scarificator only upon cysts as they become apparent, he uses a bayonet pointed one and makes from fifty to a hundred punctures into the diseased area or areas from once to twice a week and makes an application of iodized phenol strong enough to destroy or cause atrophy of what remains of the epithelial cells in glands that are already seriously damaged by the inflammatory action, but not strong enough as used to destroy functionating glands. The application consists of one part each of iodin crystals and glycerin and two parts of phenol. A few treatments are made twice weekly, then once weekly until the surface looks and feels normal. After a few months the patient reports for examination and possible treatment of cystic follicles that had not been reached.

"In conclusion, I wish to repeat that I am not advocating such treatment as a substitute for trachelorrhaphy or trachelotomy, but as an alternative in cases in which such operations are not available or advisable. It is the treatment of choice only in cases in which there is moderate cyst formation or in cystic degeneration confined to a limited area. My object is not so much to extend the field of local treatment as to increase its efficiency when it is employed."

Dr. Robert L. Dickinson, of New York, read a paper on **Endocervicitis and Eversion and the Nasal Cautery Tip.** (For original article see page 600.)

Dr. Reginald M. Rawls, of New York, read a paper entitled **End Results of Amputation of the Cervix and Trachelorrhaphy.** (This paper will appear in the January issue.)

DISCUSSION ON THE PAPERS OF DRS. HENRY T. BYFORD, ROBERT L. DICKINSON AND REGINALD M. RAWLS

DR. ARTHUR H. CURTIS, Chicago.—I am impressed with the fact that we are still rather inclined to operate and to treat cervices entirely too much. I can see no reason why we should treat the cervix unless there be some very definite indications. What are those indications? First, there is cancer or impending cancer of the uterus. I say impending cancer with the understanding that you will all appreciate what that means, without further discussion. Second, sterility. Until we know more about other conditions which cause sterility, such, for instance, as patency of the tubes, gonorrheal infection in the husband, and other factors, I believe we should not under any circumstances attempt any reparative or plastic work upon the cervix for the relief of this condition. It is my belief that if sterility is due to disease of the cervix, it is ordinarily an instance in which we have a very marked infection with leucorrheal discharge. So finally we come to another possible indication for the treatment of the cervix, and that is the leucorrheal discharge, either because it is an infectious process or because the leucorrheal discharge annoys the patient and requires treatment. Further, I believe focal infection of the cervix is an important indication for treatment, but focal infection of the cervix hardly ever occurs unless there is also a leucorrheal discharge.

What is the pathology of cervical disease? There are two important types. First, there is that type of pathology associated with pregnancy. As a result of bearing children, there is edema, eversion, laceration, and torn cervical lips, often-times associated with the formation of cysts, and sometimes with discharge. Second, there is disease of the cervix which occurs in women who have not had children and which is usually of gonorrheal origin. If we have a disease of the first type which I mentioned, that is, tearing with eversion, erosion and other lesions which occur after childbirth, I am impressed that the methods which have been recom-mended by Dr. Byford, and which Dr. Dickinson has described so nicely, will cure the great majority of patients. Amputation of the anterior lip after separating the bladder, as we do in the advancement operation, will oftentimes remove the focus of infection. On the other hand, if there is extensive gonorrheal disease or other serious infection which extends upward as far as the internal os, I am inclined to think these procedures do not reach high enough to eradicate the trouble in such cases. Even the Sturmdorf operation, although it oftentimes will relieve the infection if it is in the lower portion of the cervix, is not radical enough to remove the entire focus. We must then have recourse to measures which will get rid of the deep-seated trouble. I believe here we have a field for radium treatment. Small doses of radium put into the cervix up to or beyond the level of the internal os will destroy the excessive glandular growth. If we keep the cervix dilated so that it does not stricture, radium applied in small doses at intervals of not more frequently than once in three months, will relieve these patients.

I think the most important principles in the treatment of infected cervices consist in the destruction of Skene's ducts and dilatation of the cervix, and use of a small dosage of radium not more frequently than once in three months. We use two twenty-five milligram tubes in tandem, applied for not more than six or eight hours, with a screen of one half millimeter of gold. The treatment ought not to be repeated short of three months. Subsequent treatment will depend on whether menstruation has been shortened as a result of the use of radium.

DR. HENRY P. NEWMAN, San Diego, California.—There are so few normal cervices in the nonparous, as well as parous woman of today, that this subject is naturally of great importance to the gynecologist. Fortunately correction and relief of these defects have not been limited to the two definite and circumscribed operations cited by the essayist. Amputation of the cervix and trachelorrhaphy are, in my opinion, operations of the developmental epoch of gynecology and have few or only exceptional indications in present day surgery. Tracheloplasty, an operative technic for which I discarded all former methods and which I offered to the profession some two or more decades ago in various publications[*] is, as its name implies, the surgical repair of defects of the neck of the uterus,—in other words the removal of the pathology and the plastic reconstruction of the organ. By this method, both contour and function are conserved. When properly understood its simplicity of procedure and general adaptability leave little to be desired in corrective and restora-tive surgery of the cervix.

DR. THOMAS J. WATKINS, Chicago.—I am enthusiastic about the use of radium in these cases when properly administered because it cures the erosion.

DR. HENRY T. BYFORD, (closing the discussion on his part).—In my paper I merely spoke of one phase of cervical endometritis. Last year I read a comple-mentary paper on inflammation higher up in the cervix, about the internal os. My chief reason for giving treatment is the remote danger of carcinoma, and I do not

*Newman, Henry P.: The Indications for Plastic Surgery upon the Cervix Uteri, Trachelo-plasty, with a New Method of Operating. Jour. Am. Med. Assn., Sept. 10, 1898, xxxi.
Newman, Henry P.: Tracheloplasty. Jour. Am. Med. Assn., April 20, 1901, xxxvi.

feel satisfied in merely telling the patient to come back for examination occasionally, so that I can watch her case. If she is coming back occasionally for inspection, I may as well cure her in the first place and remove the risk. I think Dr. Dickinson's delicate way of cauterizing the tissues is intended by him for so-called erosions that are more superficial, but it is necessary in these cases to penetrate the tissues more deeply.

DR. ROBERT L. DICKINSON, (closing the discussion on his part.—I wish to draw attention to the extraordinarily small number of true carcinomatous conditions found on section of these amputated cervices. I wondered whether Dr. Curtis in making the sweeping statement he did concerning the cystic cervix meant that it should be let alone. I was not talking of little cysts; I showed pictures of deep-seated cysts. I do not think Dr. Curtis meant that we should disregard granular raw areas that have been giving symptoms for many years in which cancer can and may develop, and I think it ought not to go out from this Society that such conditions can be disregarded.

As to the use of radium, I have seen two penalties with the use of radium due possibly to unskillful treatment, and either an overdose or a repeated dose produced a senile cervix with scar tissue, secreting an acrid material that continued to chafe the vulva. I cannot cure one such patient. The same thing occurs in the intractible menorrhagias where an overdose of radium has done damage to the uterus, producing an exceedingly irritating secretion. Radium, therefore, must be used with expert care, perhaps in nonrepeated treatments.

DR. REGINALD M. RAWLS, (closing the discussion).—In regard to Leonard's statistics, if we make a careful study of his report we will find his results have been based on 400 cases operated on in Dr. Kelly's clinic, and that he followed up by letter the great majority of them. Furthermore, he states distinctly that all his amputations were high amputations of the cervix; that is, a cuff was made and two and a half centimeters of the cervical tissue was removed. In the series of cases I studied it was impossible for me to get the number of low, medium, and so-called high amputations which some of the operators referred to in their histories of cases of cervical disease. We are dealing with a series of cases in which some of the amputations were high, some medium, and some low.

Furthermore, as to the more frequent occurrence of abortion following amputation, it would occur more frequently in those cases in which high amputation was done.

In regard to dystocia, I shall publish in the paper several cases in which operative procedures were followed by pregnancies. The outstanding points in the study of these cases are: In amputation of the cervix the first stage of labor is shorter than after trachelorrhaphy. Patients who have had amputation of the cervix, those who answered by letter, have reported their labors were easier where we know for comparison, the total number of hours of labor previous to amputation, and although these women have had one or two children, they may have had labor extending over twelve or twenty-four or forty-eight hours in the previous pregnancies. Their labors have been much easier following this procedure. The labor has lasted four or five hours in some as compared with twelve or twenty-four hours before this operation was done. In all cases where there is a report obtainable, any re-laceration in subsequent pregnancies that may have occurred took place after trachelorraphy and not after amputation.

OBSTETRICAL SOCIETY OF PHILADELPHIA. STATED MEET-
ING, APRIL 7, 1921

THE PRESIDENT, DR. JOHN A. McGLINN, IN THE CHAIR

DRS. EDWARD A. SCHUMANN AND CHARLES S. BARNES presented a paper
entitled **Syphilis and Childbirth;—Observations on 661 Cases Oc-
curring at the Philadelphia Hospital.** (For original article see page
612.)

DISCUSSION

DR. PHILIP F. WILLIAMS.—Several years ago Dr. Kolmer and myself
studied a series of 300 Wassermann tests in cases that came into the Gynecological
Dispensary at the Presbyterian Hospital. Our incidence there was about 20 per
cent. We found naturally that the colored population applying at the Gyne-
cologic Dispensary had a larger incidence of syphilis than the white women. In
that series of cases we had about forty pregnant women, in whom the incidence
was 17 per cent. In four women who came in with stillbirths, three of them
had positive Wassermann tests; there were 14 cases of habitual miscarriage,
of whom 43 per cent had positive reactions. A little later we worked up an-
other series of cases of women who were aborting, that is, cases that were pres-
ent in the hospital and in a bacteriologic study of these women (complement-
fixation test) we found that 8 per cent of the series had positive reactions for
syphilis. In the 30 women in the first series who had abortions, there were
about 33 per cent with a positive reaction. In 1919-1920, we started to make
Wassermann tests in the mothers and from umbilical cord blood at the Medico-Chi
Maternity service. We had 227 tests performed in the service, among which 190
women and 190 children gave a negative reaction; with blood and umbilical cord
Wassermanns. Nineteen of the women gave positive reactions, where the cord
blood was moderately or weakly positive, that included also one syphilitic fetus,
which makes an incidence of about 8 per cent and, divided between black and
white of 7.4 per cent black and .6 per cent white. In the service we had but one
woman who gave a negative Wassermann reaction where the baby's cord blood
was positive. In that case the cord blood was reported as weakly positive. It
was about a week after the woman was delivered when we got the report and
we gave immediately an injection of neoarsphenamine, and five days later got
a weakly positive Wassermann in the maternal blood. All the cases at the
Medico-Chi that have given even weakly positive reactions have been turned
over to the Social Service and referred to the Pediatric Clinic and Syphilis
Clinic at the Polyclinic for further treatment. The problem of transmission of
syphilis is naturally a very interesting one, but at the same time one very, very
seldom finds a case in which there is negative mother's and a positive cord blood.

In the Medico-Chi we took the Wassermann test when the women came into
the clinic in labor. When we had an idea that syphilis might be present we
sent the placenta to the laboratory for study and have never yet received a re-
port that the placenta was syphilitic. It seemed we should have obtained it
two or three times in view of the fact that several other large maternity clinics
in the United States have reported that syphilis in the placenta seems to be
rather a common thing. Jeans and Cooke reporting a year ago on syphilis in St.

Louis, said the coincidence of positive cord blood Wassermann and syphilis in the placenta was 95 per cent. So far as Colles' law is concerned, the Wassermann reaction undoubtedly has upset to a certain extent the rules to explain these interesting phenomena. Women who formerly had been considered subjects of Colles' law are undoubtedly latent syphilitics and indeed there are some women who would be considered by Colles' law nonsyphilitic, yet spirochetes have been demonstrated in their lymph nodes. As to Profeta's law the children are very probably cases of latent or congenital syphilis, although they do not show it. It has been an interesting thing to me in working right along with these women, as we have not taken these figures from any records done by other men or other services, but I have seen every one of these women whose report comes back positive and I have talked to them and tried to elicit the history of infection and it has been an extremely difficult thing to secure. In fact we have not had more than two or three women in all this series of Wassermann cases that gave me any history at all. They give no history of a primary lesion and none of a secondary. You do not find any gummas, the epitrochlear glands are not enlarged, neither do they have any other evidence of syphilis. I do not know whether they are all congenital syphilitics or not. So many of them, practically all, seem unable to give any history of infection. In fact only two cases in the Medico-Chi series gave a history of syphilis. One was a colored girl, referred to us from another hospital where she had come in with secondary syphilis. Being pregnant she had been referred to our clinic for delivery. She had a negative Wassermann, umbilical cord was negative and the placenta was negative for syphilis because of her intensive arsphenamine treatment during pregnancy. We had another girl seventeen or eighteen years of age, white, single, who was referred to us for delivery at the beginning of the ninth month of pregnancy. She had a chancre on her upper lip. She came into the syphilis clinic at the Polyclinic for treatment for this chancre. She was on intensive arsphenamine treatment at the Polyclinic, came into the maternity ward and was delivered of a healthy looking child, weakly positive cord blood reaction. That woman went back to the Polyclinic for further treatment. We bled the child once six weeks after it had been born and it had a negative Wassermann then. The woman's condition subsequently cleared up. Dr. Kolmer has said that some of these positive cord blood Wassermann tests were possibly due to the transference from the maternal end of the cord of a certain amount of syphilis ''reagin'' which might account for positive reactions in these apparently healthy children. I would like to hear from Dr. Barnes and Dr. Schumann as to whether or not any work was done on women with a negative reaction but with positive babies' blood and whether the placenta was studied in any of these cases.

DR. STRICKER COLES.—One question has been interesting to me in reference to the syphilis of the father. I have had two cases occur in rather prominent people. One of these men was treated by Hunter McGuire, of Richmond. This was before the Wassermann test was discovered. He treated this young man over a course of ten years. Then he said: "You are well, you can get married." I knew the woman the patient married, she was a patient of mine. She was apparently a healthy girl, but gave birth to three syphilitic children. Another case was treated by a well known genitourinary specialist, Dr. Orville Horwitz, now dead. He treated the man for a long time. He said to this man: "You are well, get married." He married apparently a perfectly normal and healthy girl and she gave birth to a syphilitic child, macerated and with every evidence of syphilis. What I would like to know is, if a man is treated by a good syphilologist until pronounced well, and he married, would he have syphilitic children? The women I referred to had syphilitic children and they

did not show any evidence of it, either one of them. The woman who married the man treated by Hunter McGuire lived many years and never showed any syphilis; she died from other causes. As far as I know these babies were syphilitic. They were born naturally and showed syphilis. Now how did they get syphilis? As to the Wassermann reaction, I am disappointed. I cannot depend upon it. Some cases have been syphilis negative and the clinical symptoms and Wassermann reaction do not always agree. I would like to ask whether any of the members of the Society have ever had one of these cases—a man cured, marrying a healthy girl, the offspring being syphilitic.

DR. EDWARD A. SCHUMANN.—Dr. Barnes and I both being pessimistic, this paper was written as the result of disappointment after we decided to look over the records of Blockley and make a very interesting and valuable contribution to the subject of syphilis in childbirth. After spending hours out there, the result of our labors is before you and it means absolutely nothing. The routine standard procedure in obstetric clinics is to take a Wassermann reaction when the patient enters the hospital, if positive she has syphilis; if negative, she has not. At the time of delivery the cord blood is sent to the laboratory and there are recorded these statistics. And so all over the world percentages are based on these very imperfect, casual sort of statistics, and then the syphilographers will say very definitely, ''Every syphilitic mother has a syphilitic baby,'' but they cannot prove it. I have a case in my practice, a woman actively syphilitic. In 1910 she became pregnant and delivered herself of an apparently healthy infant. The Wassermann reaction in that child was never positive. That child, at least until six or eight months ago, when I last saw him, never presented any evidence of syphilis. The family are anxious about him and have Wassermanns once a year. When reported to syphilographers they say: ''Yes, but wait for another ten years!'' By that time no one could tell whether the disease is congenital or acquired and therefore I maintain that these various old laws have not been definitely disproved. I hold no brief for them, but I know we will get no further until we do intensive work in hospitals with obstetric services. We must call into conference the syphilologists.

Pathologists differ widely in their interpretations of what constitutes a syphilitic placenta. Accepted textbooks on gynecology fail to give any definition of a syphilitic placenta. The only definite pathology would be the finding of the spirochete in the villi and as Dr. Williams has stated you may examine hundreds of slides and find perhaps one spirochete!

DR. LIDA STEWART-COGILL.—I desire to report two cases in which the macerated babies showed spirochetes in the tissues and yet a negative reaction was found in both mother and father. My experience, small as it is, is very similar to Dr. Barnes' and Dr. Schumann's. I am often disappointed as time and again we have healthy infants and the mother shows the Wassermann reaction. As far as local reaction is concerned, Dr. Meine of the Woman's Hospital made examinations on one hundred cases at the time we were interested in wet nurses. We found the reaction varied, the mother would have a positive reaction and there would be a negative reaction in the cord and so we pay no attention to the reaction we get in the cord.

DR. JOHN A. McGLINN.—We deliver about 350 illegitimate children a year at St. Agnes'. Gonorrhea is present in about 55 per cent of the cases; we find syphilis very seldom present, although we do Wassermanns in all these cases and we seldom find positive Wassermanns or any evidence of syphilis in the children. All the children are studied from the standpoint of Wassermann and clinical syphilis before they are sent out to wet nurse. Dr. J. Whitridge Williams

in a paper read at the American Gynecological Society stated that as the result of his study he is not prepared to say we could discard Colles' and Profeta's laws. There were certainly some cases that would indicate that they were still effective. Dr. Coles asked some of us to state a case where the father was positive and we were certain that he had a healthy child. I had such a case where a man went to a dentist, had a tooth treated, developed a chancre of the gum. He recovered from the chancre and had a positive Wassermann subsequently. He was treated until he had a negative Wassermann and then carried on still further with treatment for two years and observed for four years after his final treatment with no clinical evidence of syphilis and with negative Wassermann. He was engaged to be married and he told the young lady of his plight and she agreed to wait. She finally broke her engagement. Finally he married another woman and they have a very healthy child. There is no evidence of syphilis in the man or woman. There are cases where women have definitely syphilitic children and repeatedly negative Wassermanns beforehand, with no evidence of syphilis on the part of the woman. I recall a woman who has repeated macerated fetuses, she did not bring a living baby into the world until the fifth pregnancy. She was studied serologically here, in Berlin, and in Petrograd. A negative Wassermann test resulted both for her and her husband; she then became pregnant again and during pregnancy she was treated actively for syphilis and brought forth an apparently healthy baby.

DR. CHARLES S. BARNES.—There are some very interesting and peculiar things in relation to this subject. I recall a case in which a young woman came to me for attendance in pregnancy and childbirth two years ago. She was a splendid looking woman so far as appearance was concerned. She gave birth to a well developed child. So far as I believe there was no birth injury. Without rhyme or reason the baby died in a few days. She had a history of one miscarriage. She was very anxious to have children, and she became pregnant soon again. Last fall she gave birth to a macerated fetus. Wassermann examination upon the husband and woman have been negative and there is no suggestion, so far as clinical evidence is concerned, of syphilis in either; and yet the thought hangs over her husband that the wife's father died of some form of neurosyphilis. It makes me wonder if there is not, in her case, some very latent congenital condition of syphilis which leaves its impress upon her offspring. What I think is most essential in this connection is to emphasize the necessity of more intensive scientific study of this subject.

Department of Reviews and Abstracts

Selected Abstracts

Pregnancy Complicated by Disease

MacKenzie: Heart Disease and Pregnancy. The Lancet, London, 1921, cc, 1163.

During the early months of pregnancy practically no changes in the circulation can be detected. Towards the sixth month response to effort begins to be noticeable in breathlessness after slight exertion. At about the seventh month the heart frequently is displaced until the apex is pushed out one inch beyond the left nipple line, and upwards to the fourth interspace. This change was thought due to hypertrophy of the left ventricle, an assumption for which MacKenzie has been unable to find any anatomic evidence.

In some patients the veins of the legs, of the thighs and vulva swell. Hemorrhoids are frequent. These changes are the result of actual pressure on the veins and not of back pressure from the heart. Marked change in the peripheral vascular system, in the smaller arteries and veins, is particularly evident in the breasts. Varicose veins are common in people with perfectly healthy and efficient hearts. Not the result of back pressure is a pulsation in the veins of the neck. Among healthy women these pulsations are present at one time and absent at other times. The writer carefully explains this phenomenon.

Swelling of the legs, not caused by nephritis, is common. During pregnancy in many patients the face becomes tinged and dusky while the lips become dark red.

Many patients suffering from cardiac disease show abnormal circulatory signs during pregnancy. The great majority, however, pass through pregnancy, confinement and puerperium with no trouble. Some cases of mitral stenosis do not suffer in the least, while others suffer severely. Cases of arrythmia show great variations, the great majority passing safely through. Cases, again, in which the heart is weakened from causes but presents no abnormal physical signs, such as murmurs or irregularity, bear pregnancy well and seem little the worse afterwards.

There are two forms of heart force: one, sufficient for the needs of the body when at rest—the rest force; and another held in reserve and used only when an effort is made—the reserve force.

The pregnant state imposes more work on the heart not only in connection with the maintenance of placental circulation but also in respect of the additional weight carried by the mother. There are also disturbing factors in the form of interference with the shape and movements of the chest wall, and displacement of the heart itself which call upon the reserve force.

The first signs of heart failure are a diminution of its power to respond to effort and the subsequent functional impairment of organs inadequately supplied with blood. Diminished circulation through the cleansing organs of the body leads secondarily to an accumulation of waste products in the blood. Its consequences react upon all the organs expressing themselves chiefly in breathlessness and pain in the heart region. One or the other of the symptoms is always present, however slight the degree of heart failure. Dropsy and enlarged liver are sometimes spoken of as cardinal signs of heart failure, but they occur only in heart failure from certain diseases and in an advanced stage of the condition.

Pulmonary stasis tends to occur in cases of pregnancy complicated by mitral stenosis. MacKenzie found that while crepitations at the bases of the lungs were of relatively frequent occurrence in healthy pregnant women as well as those suffering from heart disease, they were of serious significance and an indication of danger only when the pregnancy was complicated by heart disease. They are, in his opinion, due to edema occasioned by a diminution of the force of the right ventricle. The danger in mitral stenosis lies in the addition of the embarrassment caused by the pregnancy to the already existing pathology. Back pressure is a factor only in some cases. In mitral stenosis the left auricle undeniably is often embarrassed and in some cases the pulmonary circulation shows this disability.

About 90 per cent of the cases of heart failure with dropsy and enlarged liver observed by MacKenzie were cases of auricular fibrillation. Moreover in the great majority of cases of heart strain, i.e., where heart failure with breathlessness had suddenly set in while the individual was making a violent or prolonged effort, the failure was due to the sudden onset of auricular fibrillation. It is often attended by little or no impairment of cardiac efficiency. In such cases the heart muscle is good and the rate of the heart not markedly increased.

Some physicians admit that murmurs may exist without significance, yet to them the difference between murmurs of serious importance and those which are innocent is so vague that they consider it wiser to view all murmurs with suspicion. In no field of medicine this attitude toward murmurs proves so disastrous as in pregnancy. The detection of an innocent murmur has often been a reason for forbidding pregnancy or even marriage.

The writer next explains in detail the characteristics of physiologic and functional murmurs not necessarily produced by dilatation of the heart, and discusses their differentiation and proper interpretation. Estimation of the significance of murmurs, as of all other signs, should be based not on the murmur itself but on the functional efficiency of the heart and on the presence or absence of additional symptoms of cardiac mischief (size, rate, rhythm). The detection of a mitral systolic murmur in a woman who is pregnant or may become pregnant should cause the physician to consider the following points: (1) The response to effort; (2) the size of the heart; and (3) the rhythm of the heart. If the response to effort is good and the heart is not increased in size, then the murmur requires no further consideration, as in all likelihood it is physiologic. If there be an increase in size of the heart, but no diminution in the response to effort, and if the circulation is well maintained, pregnancy may be allowed, even if there be a history of rheumatic fever. If the size of the

heart is increased and the response to effort is limited, the case requires careful consideration. It must be determined whether the limitations are or are not due to a temporary cause, and whether or not the heart muscle has been damaged.

If there is an irregularity of the rhythm of the heart, its nature must be carefully investigated. Should the irregularity prove to be of the youthful or respiratory type, then there will be no danger if pregnancy is incurred. If, again, it is due to extra-systoles, no fear need be occasioned by their presence. In such instances opinion must be based on the presence or absence of other signs (size of the heart, response to effort).

The heart affection most frequently causing danger in pregnant women is a mitral stenosis following rheumatic fever. Back pressure develops as the result of the narrowing of the mitral orifice. There is a tendency to congestion of the lungs. More work is thrown on the left auricle, and right ventricle and auricle. When these begin to fail pulmonary circulation becomes embarrassed. In cases of pregnancy the growth of the uterus adds to this embarrassment. The damage due to rheumatic fever, however, frequently extends also to the heart muscle, later indicated by a presystolic murmur. Therefore, even a short presystolic murmur in the presence of a marked inefficiency of the heart means danger in case of pregnancy. When the heart is large or irritable, and effort readily produces palpitation and breathlessness, even if there be no diastolic murmur, pregnancy should be forbidden.

Aortic stenosis apart from regurgitation is extremely rare in the young. In general, pregnancy may be permitted in a young woman with aortic regurgitation, if there is no Corrigan pulse, if the heart is not, or only slightly, enlarged, and if the response to effort is good.

The importance of irregularity of the heart's action has not been sufficiently recognized. Even today, few physicians, and evidently no obstetricians, have made themselves familiar with this subject. As a consequence the subject is shrouded in mystery; and where we get mystery we get fear, and we find people with irregularities treated like people with murmurs. In pregnancy we have to deal chiefly with three forms of irregularity: respiratory irregularity, extra-systoles, and auricular fibrillation.

In the respiratory irregularity, probably the most common of all, the pulse is continuously varying in its rate. When the patient is made to breathe slowly and deeply, the relationship of the altering rhythm with the different phases of respiration can easily be determined. Respiratory irregularity is common in healthy young women and occurs in women of mature years, especially if nervous. In no case should it be a reason for treatment or a bar to pregnancy.

The extrasystolic irregularity is due to a premature contraction of the ventricle. When this irregularity is the only abnormal sign it can be ignored. MacKenzie found extrasystoles present in 50 per cent of healthy pregnant women.

The form of irregularity which is most commonly associated with heart failure in women at the child bearing age is that due to fibrillation of an auricle. The astonishingly good effect of digitalis in these cases has been convincingly shown by MacKenzie.

The author's experience with pregnancy in women with auricular fibrillation is limited to half a dozen cases. All gave a history of rheu-

matic fever and all had mitral stenosis. In each case the advance of pregnancy was accompanied by increasing signs of heart failure. In all but one, premature labor set in between the sixth and seventh months. All patients lived through the confinement, but none ever recovered the former degree of health. In his experience pregnancy does not produce immediate heart failure in these cases, but so weakens the organ that it hastens the fatal issue. MacKenzie believes that auricular fibrillation should be a bar to pregnancy. Should pregnancy have occurred, careful observation must be maintained.

There are other abnormal rhythms which may have to be considered in the pregnant state. The most common of these is known as auricular flutter. This form of paroxysmal tachycardia may occur with different types of heart trouble. Its significance in pregnancy should, therefore, be considered in relation to the presence or absence of disease.

The neurotic heart is a very distinct type in which the symptoms are due mainly to disturbances of sensation. Attacks of great severity, resembling angina pectoris, sometimes arise. Pregnancy can safely be undertaken by these people. It often does them a great deal of good.

When congenital defects of the heart exist and the organ is large, or when there is cyanosis or clubbing of the fingers, the response to effort will be so limited that pregnancy obviously is a definite danger and should be avoided. When on the other hand, the heart is normal in size, or only slightly enlarged, the response to effort good, and no cyanosis present, then, notwithstanding any physical sign, such as a murmur, marriage and pregnancy may be allowed.

With an inefficient heart, the pregnant patient should be examined weekly for signs of heart failure. The patient should be confined to bed sitting up or lying propped up, since lying down tends to hamper the circulation in the bases of the lungs. Several times a day she should be made to breathe deeply to assist the right heart in expediting the flow of blood through the lungs. If the heart failure thus is kept in check, the pregnancy can be allowed to go to full time. When labor has advanced so far as to justify interference, it should be terminated artificially, thus avoiding the strain of the last stage. When the heart failure is so extreme as to threaten life, intervention is necessary and labor should be induced.

Sleep is essential during pregnancy. If necessary, the milder hypnotics should be given.

This monograph represents the most exhaustive and instructive study of this important problem offered in recent years. Only its salient points, of interest to the obstetrician, are given in this abstract.

NORMAN F. MILLER.

Rowlette: A Note on the Heart in Pregnancy and Labor, Dublin Journal of Medical Science, June, 1921, No. 16, p. 260.

The effect of pregnancy on the physiology of the heart is considered by the author to be evidenced first, by the displacement of the heart upward and outward, and second, by a certain amount of hypertrophy. The first effect is readily demonstrable, but the degree of hypertrophy is subject to question.

Corroborating MacKenzie, Rowlette finds evidence of disturbed function "incidental to pregnancy": " (a) Limitation of the field of cardiac

response. (b) Changes in rate and rhythm. (c) Dilatation of the right side of the heart. (d) Tendency to edema of the lungs. (e) Tendency to overfilling of the veins of the legs. (f) Marked pulsation of the veins of the neck.'' Such disturbances are more pronounced in the diseased heart and immediately influence the judgment of the obstetrician.

The author calls attention to the fact that statistics in regard to the incidence of heart disease and the mortality rate from heart disease when associated with pregnancy, vary widely from MacDonald's (70.6 per cent) to those of Fellner from Schauta's Clinic (.1 per cent). This discrepancy he believes is due to the failure to note mild cases on the records in the one, and to the inclusion of every functional murmur in the other group. An analysis of the Rotunda statistics from 1905 to 1915 reveals 46,204 deliveries with 168 deaths, 11 of which deaths were associated with some cardiac disease. Therefore, in 6.54 per cent of all deaths heart conditions were noted, and death associated with heart disease occurred in only one of every 4,200 women delivered.

Rowlette emphasizes that each individual case must be analyzed from two view-points, ''first, the nature of the organic lesion, and second, the condition of the heart to meet the demands made on it.'' Under the first head, mitral stenosis seems to be the most serious for the pregnant woman; under the second head, subjective and objective symptoms, such as dyspnea, cyanosis, enlarged liver, and general edema forewarn of impending failing compensation. The earlier in pregnancy compensation fails the more serious the condition. A. NOWELL CREADICK.

Thomas: **Heart Flutter and Fibrillation in Pregnancy.** Journal American Medical Association, 1921, lxxvi, 1227.

While the literature on cardiac complications in pregnancy is rich in the description of valvular lesions, Thomas was unable to find any mention of cardiac arrhythmias in pregnancy. He reports the following case: The patient was admitted to the hospital in a semicomatose condition, being about six months pregnant. The electrocardiogram taken at that time showed an auricular flutter at the rate of 320 per minute which changed to a fibrillation by the next day. Under digitalis medication she gradually improved and after a four weeks' stay in the hospital, was delivered of a $5\frac{1}{2}$ pound dead fetus. Labor itself caused no difficulty and the patient left the hospital soon afterwards in good condition. Thomas emphasizes the importance of early diagnosis.

R. E. WOBUS.

Wiesel: **Pregnancy and the Circulatory System.** Monatsschrift für Geburtshülfe und Gynäkologie, 1921, liv, 73.

Wiesel states that, as a normal pregnancy reaction, there occurs an hypertrophy of the heart and of the peripheral vessels, which in the latter shows itself as a peculiar infiltration of the wall, involving the musculature but not participated in by the elastic tissue. In many diseases of the endocrine glands one sees a very similar picture. Obviously the endocrine organs are responsible for the changes in pregnancy. Before the end of the gestation period these new tissues undergo a fatty degeneration. Anatomically, it can be shown that, in pregnancy complicated by heart disease, the formation of new muscle in the vessel walls

is much less marked than when the heart is sound, a fact which quite explains the tendency to disturbances of compensation.

Clinically, mitral stenosis is the most serious complication, although acute myocarditis is very dangerous. Recurring endocarditis is always an indication for interrupting the pregnancy. Hyperthyroidism and Basedow's disease are likewise of serious import. The general condition of the patient and the state of her nutrition must always be considered.

E. D. PLASS.

Meurer: Leukemia and Pregnancy. Nederlandsch Tijdschrift voor Geneeskunde, 1921, lxv, 1440.

A woman was admitted to the hospital in the seventh month of pregnancy complaining of pain in her lower abdomen. She had previously given birth to seven healthy children and had had one abortion. Two years before admission, she had grippe pneumonia and one year later applied at another hospital on account of an enlarged abdomen, considering herself pregnant. The enlargement, however, was found to be caused by an enlarged spleen. At that time she remained in the hospital for about three months, having a rise of temperature during the first weeks. Her spleen extended to the linea alba, the blood containing about 3,320,000 erythrocytes and 250,000 white cells.

At the present admission the uterus was found pushed to the left by the enlarged spleen, which extended beyond the midline. The liver was distinctly palpable. No enlarged glands were demonstrable. The urine showed traces of albumin and the temperature was about 101. The blood contained 3,200,000 erythrocytes and 432,000 leukocytes; hemoglobin, according to Sahli, was 42 per cent.

On account of her increasing asthenia, the induction of labor was considered, however, at 35 weeks she gave birth spontaneously to twins weighing 1850 and 1950 gms. respectively. Both did well during their stay in the hospital. The maternal side of the placenta showed the typical leukemic blood, while that on the fetal side was perfectly normal. One month postpartum, the maternal blood containing 1,910,000 red cells and 92,000 white cells, the hemoglobin being 37 per cent.

R. E. WOBUS.

Esch: "Pseudopernicious" Anemia in Pregnancy. Its Cause and Curability. Zentralblatt für Gynäkologie, 1921, xlv, 341.

The clinical appearance and course of pernicious anemia in pregnancy, labor, and the puerperium, are known, but there are few reports on the end results with these patients, and the etiology of the disease is still obscure. Esch has already reported six cases, of which three died in the first few days of the puerperium, two recovered, and one was markedly improved. One has since gone through a pregnancy without recurrence and with a normal blood picture. Two have been under observation for nine years, and one for six years, and all are free from recurrence. An interesting point is that in all there are nine cases reported healed without a single case of recurrence.

Hematologists have been unable to fasten true pernicious anemia on pregnancy or the puerperium. The unusual cases in which pernicious anemia follows the well-known anemia of the puerperium must be considered as coincidences rather than consequences. The fact that this

"pernicious-like" anemia of pregnancy is cured, is an evidence that pregnancy is its cause. In fact it is only those forms of pernicious anemia, where the cause is known, that may be cured. Further evidence is the fact that improvement and cure of the pernicious form of anemia in pregnancy, when it occurs, comes after delivery. Moreover the fact that in these cases there are no recurrences makes it differ from the cryptogenic pernicious anemia type. Each has already declared that true pernicious anemia is not the result of pregnancy, and seeks for a causal relationship between pregnancy and this "pseudo-pernicious" anemia. Naegeli believes the true form to be due to the action of a specific toxin on the bone marrow. Morawitz and others consider the alteration in the bone marrow to be compensatory for the breaking down of the blood, which is the primary condition. Without taking sides in this question, Esch believes the "pseudo-pernicious" anemia to be of the Morawitz type. The maternal blood is to a certain extent broken down in the placenta and furnishes, for example, iron to the fetus; there is a partial hemolysis. This necessitates intensive regeneration of the blood, with possible alteration in the bone marrow and a markedly altered blood picture, with a tendency to many evidences of hemolysis on the part of the pregnant woman—for example, hemoglobinuria, icterus, etc. It is assumed, therefore, with reason, that the pregnancy anemia is of hemolytic origin, and the alteration in the bone marrow and the appearance of immature blood cells in the circulation are secondary. From this it is evident that the "pseudo-pernicious" anemia of pregnancy differs in essential points from true pernicious anemia, inasmuch as its cause is known, being a symptom complex resulting from the pregnancy, and further may completely disappear. It is better described as "pseudo-pernicious" or "pernicious-like" anemia, which marks its difference from the true form in course and prognosis.   H. M. LITTLE.

Heynemann: The Treatment of Kidney Diseases During Pregnancy.
Therap. Halbmonatschefte, 1921, xxxv, 134.

In the treatment of the kidney of pregnancy the author considers bed rest as one of the most important factors. This, by eliminating the lordosis of the upright position, favors better circulation through the kidneys. It acts beneficially on the high blood pressure and helps to maintain an even body temperature. Dietetic measures are important, especially the elimination of spices, coffee and alcohol, and the limitation of salt and fluids. Proteins should be limited to 60-70 gm. daily, carbohydrates should form the main source of nourishment. A pure milk diet is not to be recommended because of its high content of fluid, albumin and salts. The bowels should be kept open, preferably by fruits or fruit juices. Treatment with pregnant and other sera has not been found of value, nor has medicinal treatment.

Such measures are usually eminently successful but occasionally show no result even when pushed to the utmost limits. A marked increase in edema and the occurrence of pre-eclamptic symptoms may then arouse anxiety. Diaphoresis and puncture have been recommended in the treatment of the edema; the results of the former have been almost uniformly bad—the latter is to be avoided because of the possibility of infection.

The occurrence of any of the pre-eclamptic symptoms, such as head-

ache, vomiting, visual disturbances, hypertension, oliguria or pain in kidney or liver regions, should form an urgent indication for hospital treatment where careful control of the patient is possible. Venesection and narcotics are most important in the treatment. Lumbar puncture may relieve the visual disturbances. Interruption of the pregnancy is rarely indicated in the kidney of pregnancy aside from the rather rare development of urgent pre-eclamptic symptoms, extreme anasarca and continued visual disturbances. Surgical treatment, kidney decapsulation, is not indicated as the prognosis under medical treatment is good enough. Its results in eclampsia are still disputed.

An acute glomerulo-nephritis may occur during pregnancy, and is recognized by the presence of numerous red blood cells in the urine in addition to the usual findings of nephritis. It is a rather rare condition, but seems to be more common recently, possibly as a sequel of the influenza epidemic. The usual treatment of this condition in the non-pregnant state, bed rest, bodily warmth and the exclusion of kidney irritants from the diet is indicated. The interruption of pregnancy must be seriously considered in all cases, and is usually followed by marked improvement. Some manifestations usually persist for months, however, and continued careful treatment is most essential. The diagnosis of chronic glomerulo-nephritis during pregnancy is one difficult to make unless its previous existence was known. The chronic type usually exhibits marked exacerbation during pregnancy and then resembles the acute form. The indications for treatment are much the same as in the latter.

Kidney tuberculosis, where unilateral and in an early stage, is to be treated by nephrectomy without interruption of the pregnancy. Where bilateral or advanced, induction of labor is in all cases indicated.

<div align="right">MARGARET SCHULZE.</div>

Couvelaire: Two Cases of Retinitis Gravidarum. Gynécology et Obstétrique, 1920, ii, 305.

These two cases appeared in the fourth and fifth month of pregnancy respectively. Only 20 per cent occur before the sixth month. They were associated with the syndrome of renal insufficiency (oliguria and albuminuria with increased blood pressure). Nitrogen retention did not obtain.

In one of these cases the appearance of albumin in the urine did not precede the ocular symptoms and signs. This shows that one must not be satisfied with urine examination alone. Violent and persistent headache and increase of blood pressure should fix the attention on a possible toxemia of pregnancy to the same degree as albuminuria, oliguria and edema.

Nitrogen retention in retinitis gravidarum suggests a previous kidney lesion. Though retinitis gravidarum does not offer as grave a prognosis as the retinitis in Bright's disease, yet that it indicates a serious situation is evidenced by the findings of Burnier and Rochon-Duvigneaud. In 169 cases the mortality was approximately 11 per cent. Of those that recovered 14 per cent ended in blindness, 58 per cent regained partial vision and only 28 per cent recovered entirely. Immediate termination of pregnancy results in the smallest percentage of deaths or destroyed or impaired vision. Nonoperative treatment may be tried, but if the response is not rapid, expressed in diminished albumin, increase

of diuresis and reduction of blood pressure, or if the retinitis persists or extends, even in the absence of nitrogen retention, one should intervene and empty the uterus.

As to the influence of retinitis of pregnancy on the prognosis of future pregnancies, the few cases in literature indicate that although a toxemia with a retinitis in a subsequent pregnancy may not be fatal yet it is fraught with great danger to life and eye function. A future pregnancy should not be sanctioned until all signs have cleared up, especially signs of renal disability and even then, if pregnancy obtains, nephritis treatment should be instituted at the beginning of pregnancy, and the pregnancy should be terminated if persistent signs of toxemia obtain, especially at the advent of ocular signs. In such cases it is better judgment not to depend on subjective eye symptoms. The eyes must be examined frequently by an ophthalmologist to note the very beginning of pathologic changes.   R. T. LaVake.

Haffner: The So-called Placental Infarcts and Their Relation to the Albuminuria of Pregnancy, Gynécologie et Obstétrique, 1921, iii, 81.

Four hundred consecutive deliveries were followed in which catheterized specimens of urine were examined, before, during, and after labor.

All placentas were cut in 4 to 5 mm. sections.

In nearly one-half of all cases showing an albuminuria the placentas were normal. In 77½ per cent of placentas showing change the urine was normal.

Haffner sees no relation of cause and effect between placental infarcts and the albuminuria of pregnancy.   R. T. LaVake.

Fink: Causes and Significance of Edema in Pregnant Women. Zeitschrift für Geburtshilfe und Gynaekologie, lxxxiv, 1.

After discussing at length the various theories that have been expounded concerning the causes of edema in general, the author discusses edema in pregnancy. He considers the measurement of the circumference of the affected part as the best index of swelling, having found that weight, and fluid intake and output measurements were very untrustworthy. He reports results of observations over a considerable period of time on about 350 cases, finding edema of some degree in about 95 per cent. This, in most cases, he considers to be due not to primarily diseased kidneys, or to toxic effects, but rather to a disturbance of the normal balance of activity in the tissue cells, so that they absorb water more readily than they rid themselves of it. This is due to the fact that various hormones and internal secretions are thrown out of gear by the added strain of carrying on the vital functions of the child. This edema may affect any organ or tissue and when it affects the kidney, the circulation here is impeded so that the kidney cannot function normally. If the swelling is pronounced, damage to the kidney epithelium occurs, with albumen, casts, etc.—these, however, are all secondary effects, and not due to primary kidney disease. If the swelling is very great, local degeneration with the formation of toxic substances may occur with a resulting toxemia. The best treatment is to lessen the general metabolic load by keeping the patient quietly in bed, with restrictions of diet and salt intake.   Margaret Schulze.

Salomon: **Differential Diagnosis between Glycosuria and Diabetes in Pregnancy.** Muenchener medizinische Wochenschrift, 1921, lxviii. 386.

The author fixes the blood-sugar value of hyperglycemia as above 0.15 per cent and divides the glycosurias of pregnancy into three groups:

(1) Those which show a uniformly low percentage of sugar in the urine; this is the most common type. (2) Tolerance retained to a certain degree, and sugar excreted only on administration of a certain amount of carbohydrates; this is the doubtful type. (3) Sugar in the urine is high, both relatively and actually; this is the most infrequent type.

Differentiation is based mainly on the study of blood-sugar values. The blood-sugar on a "starvation" diet is first determined; a value of 0.1 per cent or less, points towards a glycosuria of pregnancy, especially if at the same time sugar be present in the urine; true diabetes generally shows, with sugar in the urine, an increase of blood-sugar on starvation. Following this, blood-sugar is determined on a carbohydrate diet. In the first group of continued low-percentage glycosuria, it is safe to begin with 50 grams of sugar and determine the degree of glycemia one hour later. In the great majority of cases of diabetes of pregnancy the blood-sugar value remains undisturbed, or rises only a few centigrams, remaining, however, below 0.15 per cent. Now the diet may be increased (especially if the amount of sugar in the urine has not been much disturbed), to 100 grams of sugar, bread and honey.

In the cases of group 2 or 3, where it is more difficult to rule out the possibility of a true diabetes, the first test is made with 150 grams of bread, and if no material increase of blood-sugar results, 50 to 100 grams of sugar are given. Generally, in a true diabetes, 150 grams of bread cause an increase in blood-sugar to a point above 0.15 per cent.

The results of this study are three-fold: (1) The "starvation" blood-sugar is 0.1 per cent or less; with even a high sugar diet, the increase is not marked, and will remain below 0.15 per cent. This is typical for the glycosuria of pregnancy, and repeated, enables one to make the diagnosis. (2) The starvation blood-sugar is as low as in "1," but on a carbohydrate diet an increase results to over 0.15 per cent. While this indicates a weakness of carbohydrate assimilation, it does not necessarily mean diabetes. This class of cases can only be diagnosed by a consideration of the clinical symptoms in addition to the laboratory test. (3) The starvation blood-sugar is already high, and the carbohydrate diet increases it still more: this condition must be considered true diabetes.

S. B. SOLHAUG.

Vincent and Gaujoux: **Epidemic Encephalitis and Pregnancy,** Revue Française de Gynécologie et d'Obstétrique, March, 1921, p. 147.

The authors report a case of epidemic encephalitis occurring during pregnancy and have collected eleven other cases from the literature. Of these twelve patients five recovered and seven died. The varied manifestations of the disease noted in general were evident in this series. The authors call particular attention to the likelihood of confusing the choreiform variety with chorea gravidarum.

That epidemic encephalitis has a higher mortality when complicated by pregnancy is doubtful. The type of the disease does not influence the

prognosis. It depends, in general, on the distribution and intensity of the infection. However, the disease seems somewhat more fatal when it occurs near the beginning or end of pregnancy.

The treatment does not differ from that usually employed. The authors do not advocate the termination of pregnancy because of the existence of the disease. JOHN W. HARRIS.

Banister and Sophianopoulos: A Case of Encephalitis Lethargica Complicating Pregnancy, The Lancet, London, 1921, cc, 1, 481.

The case reported was a primipara, 31 years of age, who developed signs and symptoms of encephalitis lethargica when practically at term. Labor was induced because (1) the patient's condition was becoming worse, (2) because the baby was alive, and (3) because it was hoped that the removal of the fetus might have a beneficial influence on the patient's condition.

Following delivery the patient improved, but only temporarily, fatal termination resulted five days after delivery. The question, as to the advisability of terminating pregnancy in these cases as an aid in treatment of the disease, is raised by the writers. NORMAN F. MILLER.

Fino and Fabini: Epidemic Encephalitis and Pregnancy, Gazzete d'Ospidale, 1921, xlii, 402.

The two patients were in the eighth month of pregnancy, and in both the course of the disease was progressive, with a grave aspect in the first case. Interruption of pregnancy by introduction of a sound had an excellent effect in both cases. The delivery of the living and healthy fetuses was easy, and there were no microscopic lesions of the placenta. The poisons circulating in the body of the mother may have caused uterine contractions due to the stimulus exercised upon the motor nerve centers of the uterus, which are localized in the spinal medulla, for the delivery took place several hours after the introduction of the sound. AMERICAN INSTITUTE OF MEDICINE.

Kirstein: Smallpox Vaccination in Women During Pregnancy and the Puerperium and Its Effect on the Newborn. Deutsche medizinische Wochenschrift, 1921, xlvii, 328.

Agreeing with the results of previous investigators, Kirstein, from extensive experience in vaccination of the newborn, finds that even repeated vaccination of the mother at any stage of pregnancy, does not confer immunity upon the newborn child. He found that in almost all cases pustules were produced on the children that were vaccinated from one to eight days postpartum. He attributes failures to error in technic. He also found that the full term babies stand vaccination quite well, but he lost one premature infant, weighing 1870 gm., as the direct result of vaccination. R. E. WOBUS.

Morawetz: Smallpox in the Newborn. Wiener klinische Wochenschrift, 1921, xxxiv, 129.

There are two ways to decide whether and in what way the newborn is susceptible to infection with smallpox: one by its reaction to vaccination, the other by observing the results of exposure of infants to smallpox.

Wolff, in 46 infants a few hours to six days old, had positive reactions in all. Von Franz and Kuhner vaccinated 300 infants in the first five days of life and found the largest percentage (36 per cent) of negative reactions in those infants whose mothers had been revaccinated during pregnancy. Von Huguenin says that there are children who show considerable immunity to smallpox and vaccination, acquired from the vaccination immunity of the mother but that they soon lose this quality.

The author had a 3½ months old unvaccinated infant taken with smallpox in a room containing 14 other infants who had been there from 1 to 6 days, all attended by the same nurse. The day the diagnosis was made all were vaccinated. Of these 14 infants, 8 developed smallpox. They were all healthy and breast fed, from 2 to 5 weeks old. Of these, 6 were light cases, 2 of whom died early from cardiac failure. Of the other two, one was a severe case, and both died.

Taking the incubation period at 10 to 12 days, the infection occurred on from the first to the nineteenth day of life. The uninfected were exposed on from the first to the thirteenth day of life.

Seven were light cases and one severe, while six were not infected, which would appear to show that infants of this age have a partial and not seldom complete immunity to smallpox. Of those not infected two had positive vaccinations, one a negative, and the others were not known.

In regard to the vaccination of the mothers of the uninfected infants nothing was discovered. The mothers of the infected ones were 22 to 37 years of age, all vaccinated in childhood; two had not been revaccinated, while six were during the war, part positively, part negatively. Vaccination done at this time was negative in all and none contracted the disease although all went to the smallpox hospital with their children.

The question is whether the immunity is obtained through the mother's milk or is acquired in utero, by the transfer of antibodies from mother to child. These were all nursing infants. Von Pfaundler says that immunity may be obtained from the mother by nursing in different diseases but not frequently. Perhaps this occurs in smallpox. Summary: Infants from smallpox immune mothers frequently are endowed with a slight protection against infection, but this immunity may not be over strong.   FRANK A. PEMBERTON.

Vignes and Stiassnie: Purpura Occurring During the Course of Three Successive Pregnancies, Le Progrès Médical, April 16, 1921, p. 167.

In a review of the literature Vignes and Stiassnie find that a grave prognosis is usually given those cases of pregnancy which are complicated by purpura. Contrary to this fact, however, these authors report a case in which purpuric lesions developed in three successive pregnancies.

The lesions occurred usually about the sixth week. They consisted of discrete, subcutaneous, hemorrhagic areas, measuring about one-half centimeter in diameter. The lesions were found for the most part over the lower trunk and the lower extremities, only a few being present above the waist line. Coincident with the appearance of these lesions the patient developed vomiting of pregnancy and hemorrhage from the nose and gums. The vomiting, although not of a severe type, was persistent throughout the pregnancy, while the hemorrhages were slight in amount but frequently repeated. Examination of the blood revealed a primary anemia of a moderate degree. The Wassermann reaction was

four plus. At no time did the patient experience fever or pains of a rheumatic nature.

In none of the three attacks was it necessary to induce labor, which started spontaneously at eight months with the first pregnancy and at term with the following two. The labors were normal and no postpartum hemorrhage occurred.

Following all three labors vomiting ceased and the purpuric areas involuted rapidly. Examination on the twenty-fourth day showed the blood picture to have returned to normal and the patient was discharged in good condition. THEODORE W. ADAMS.

Gellhorn: The Influence of Syphilis upon the Pregnant Woman. Surgery, Gynecology and Obstetrics, 1921, xxxii, 535.

While due attention has been paid to the danger of syphilis to the unborn child, Gellhorn feels that its danger to the pregnant woman has been largely overlooked. From personal observation, as well as a review of the available literature, he finds that syphilis may endanger the pregnant woman in various ways. Among these are: Insufficiency of the uterine muscle resulting in either weak contractions or rupture; stenosis of the cervix due to scars or induration; obstruction at the outlet due to large condylomata; friability of the perineum due to various lesions; premature detachment of the placenta; and even rupture of a damaged heart during labor. In the puerperium, a tendency to hemorrhage as well as sepsis due either to retained fetal tissues or to local lesions, have been noted.

His obvious conclusion is to diagnose syphilis early and, in the interest of both mother and child, to administer adequate treatment throughout pregnancy. R. E. WOBUS.

Acton: The Action of Quinine on the Pregnant Uterus, The Lancet, London, 1921, cc, 1, 216.

Acton was prompted to investigate the action of quinine on the pregnant uterus because the physician so often is asked regarding a possible effect of quinine in precipitating labor when the drug is administered to a pregnant woman suffering from malarial fever. He mentions briefly the work of various investigators and dwells on a very important factor which some of these earlier observers have failed to consider viz., the control of the malarial fever by quinine thus actually preventing the intrauterine death of the fetus. This beneficial effect he believes far outweighs any possible untoward results quinine may have in precipitating labor.

The author describes in detail his method of experimentation with the excised uteri of the test animals. In his experiments he noted that the quinine caused contractions, affecting equally the longitudinal muscle fibers of the upper uterine segment, which normally act as the driving force expelling the fetus from the uterus, and the circular fibers of the lower uterine segment, which normally relax and thus facilitate delivery of the fetus. The effect produced depends upon the dosage. Strong concentration produced a tonic spasm of the uterus which if sustained would cause asphyxia of the fetus from constriction of the placental sinuses. This condition, however, he believes could obtain only if the

patient were given an amount of the cinchona alkaloid sufficient to cause serious symptoms of poisoning.

The degree of concentration in the blood varied with the dose taken and the rate of absorption. He states further that cinchonism is correlated with the concentration of quinine present in the blood and varies with different individuals being more frequently seen in weak and anemic persons.

Concentrations such as would occur with large doses, increase the strength of the intermittent uterine contractions and if the cervix be dilated or patulous, or the membranes weak, the pressure produced by the increased contractions might be sufficient to cause rupture of the membranes, dilatation of the cervix and so induce labor.

He recommends therapeutically:

(1) The controlling of malarial fever by quinine or other cinchona alkaloid as the first objective in the treatment of these cases, augmented by sponging if necessary to keep the mother's temperature below 103° F. (2) The avoidance of large doses of these alkaloids. They should be given in divided doses of two and one-half to five grains every two to four hours, twenty grains a day being sufficient and ample to control any attack of malarial fever. (3) Finally, the associated employment of general means to prevent miscarriage, viz., complete rest in bed and judicious use of opium in allaying any mental excitement.

When the child is dead or the miscarriage inevitable quinine should be given in ordinary doses and the case treated on general obstetrical lines.

NORMAN F. MILLER.

Foggie: A Case of Peripheral Neuritis Occurring in Pregnancy. Edinburgh Medical Journal, 1921, xxvi, 250.

The author reports one case of this rather rare obstetrical complication and mentions its apparent toxic or infectious origin. The frequent association of hyperemesis with paralysis and neuritis of pregnancy suggests a common origin of the two. Clinically the condition in pregnancy resembles the peripheral neuritis met in alcoholism, the mental symptoms even suggesting Korsakow's syndrome. The common symptoms are hyperemesis, numbness and weakness of the muscles of the extremities, muscle atrophy, gripping pains of the arms and legs, loss of touch sensation, mental deterioration and delirium. Pathologically there is a degeneration of the affected nerves. Treatment consists in regulating the bowels and flushing the kidneys. The prognosis is good in most cases. Occasionally symptoms continue for several months after delivery. Unless paralysis of one of the vital nerves occurs there is no indication for inducing labor or fearing the ultimate outcome.   H. W. SHUTTER.

Franz and Katz: The Effect of Quinine on the Parturient Uterus. Medizinische Klinik, 1921, xvii, 677.

From a survey of the literature on the subject and from their own experiences, Franz and Katz reach the following conclusions regarding the oxytocic properties of quinine: (1) Under physiologic conditions, quinine cannot incite continued contractions in the completely quiescent pregnant uterus and should not, therefore, be considered legally as an abortifacient. (2) In certain pathological conditions, the drug is able

to stimulate the resting pregnant uterus to continued contractions. (3) From a practical standpoint, quinine is to be considered only as a contraction-strengthening agent, and the proper place for its exhibition is in those cases of primary inertia, in which the pains are regular but weak. (4) In secondary inertia the influence of the drug is uncertain, and when the pains have completely stopped it usually is inert. (5) Quinine is frequently useful to strengthen the pains. (6) The greater the irritability of the uterus, the earlier will the action of the drug become apparent. (7) There is apparently no method for extending the practical applicability of the drug. (8) The effect can be increased by its use in hypodermic injections.   E. D. PLASS.

Mayer: Does Pregnancy Increase the Malignancy of a Carcinoma? Zentralblatt für Gynäkologie, 1921, xlv, 629.

As support to the old idea that pregnancy had little effect on coincident carcinoma in the uterus, came the opinion of Pinard and others, that repeated pregnancies might take place in a carcinomatous uterus; and, opposed to this, the opinion of Wertheim, Sarwey, Bumm and others, that a pregnancy had a decidedly aggravating effect on an existing carcinoma. More recently Theilhalber has declared that pregnancy favorably influences the operability of uterine carcinoma.

Mayer adds considerable evidence in support of this last point of view. In 1911 he had reported 9 cases of cervical carcinoma in pregnancy, with an absolute recovery after operation in more than 50 per cent, as compared with 20 per cent in patients not pregnant. Later he was able to collect 31 cases with an inoperability of only 20 per cent, as opposed to 33⅓ per cent of cases not so complicated. He does not believe that carcinomata grow more rapidly during pregnancy.

Following the subject further (from Jan. 1, 1902, to October 1, 1920), and reviewing 1106 cases of carcinoma of the uterus, he found 56 cases, 18 of which were complicated by pregnancy and 38 of which occurred within a year of the last pregnancy. In this series of 1106 cases there were, therefore, 1.6 per cent only, complicated by pregnancy, and 3.4 per cent immediately subsequent to pregnancy. Inasmuch as carcinoma furnished but 5.5 per cent of the gynecological material, the infrequency of the association of the two conditions will be evident.

While in an earlier observation on 104 cases of carcinoma between the ages of 25 and 45, 8 or 7.7 per cent occurred between the ages of 25 and 30, in the forementioned 56 cases only 3 or 5.3 per cent were between these years. It is obvious, therefore, that youth did not predispose to a greater malignancy of carcinoma during pregnancy.

Tables are given of the operative results, which conclusively prove the "greater operability" claimed. Mayer admits that the parametrium and the glands were less actively involved than usual, and adds the testimony of Döderlein and Wertheim in support of this. He does not believe that the malignancy of the disease is increased by pregnancy, though under ordinary circumstances the diffusion of the carcinoma should be favored by the well-known alteration of the parametrium during pregnancy.

To the question, whether carcinoma in the aged is less malignant than in earlier life, the answer is difficult. Zweifel's dictum is—"The more youthful the woman, the more rapid the course of the carcinoma; the

older the woman, the less virulent the carcinoma." Mayer is opposed to this view. There is no doubt that recurrence is less frequent after 45 years of age, but inoperability increases. The decrease in the frequency of recurrence in later age is in part due to the fact that a large number die before the development of recurrence. Moreover, the observation that the greatest frequency of inoperability is later than the greatest frequency of carcinoma speaks for greater malignity in the aged. A lessened malignity of carcinoma in the aged is not evident, and it is impossible to adduce evidence based on the more resistant connective tissue of the aged, when conversely the nonresistant tissue of the pregnant woman does not allow the more rapid growth. The ovarian secretion seems to have no effect on malignancy.

Most probably the favorable factor is the increase of connective tissue during pregnancy, as there is no doubt that the development of carcinoma depends upon the resistance of the connective tissue to the development of the tumor, and Mayer has found that carcinoma occurred more frequently in women who had menstruated late, and where there was definite connective tissue hypoplasia.   H. M. LITTLE.

Reeb: Fibromata and Gestation, Gynécologie et Obstétrique, 1921, iii, 129.

One may formulate the treatment of cancer of the cervix complicating pregnancy as follows: if the cancer is operable consider only the life of the mother; if the cancer is inoperable, consider only the life of the child.

In the treatment of fibromata complicating pregnancy we must plan to save the lives of both mother and child and also, if possible, preserve the functions of gestation and menstruation.

It is important to recognize the types of fibromata that are likely to cause: (a) sterility, (b) complications of pregnancy, (c) complications of labor, and (d) complications of the puerperium.

(a) All fibromata that enlarge or otherwise deform the uterine cavity, alter the mucosa, or infringe on the channels of entrance of the spermatozoa are obstacles to fecundation.

(b) 80 to 85 per cent of pregnancies complicated by fibromata go to term without trouble of any kind.

A differential diagnosis must be made between fibroma and angular or extrauterine pregnancy, malformation of the uterus, pregnancy in the horn of a bicornate uterus, the retroflexed gravid uterus and a hematocele. The most common error is to mistake a pedunculated fibroid for an ovarian cyst or vice versa.

The types of fibromata that are most likely to arrest the progress of pregnancy are: large multiple fibroids; a very large fibroid in the fundus; an intraligamentous or retrovesical fibroid of the cervix; submucous fibroids; and pedunculated fibroids caught in the true pelvis.

The only indications for intervention during pregnancy are complications and serious accidents endangering the life of the mother such as: hemorrhages, attacks of peritonitis, torsion of a pedicle, cystic degeneration, intestinal obstruction, and pressure on kidneys, ureters, and bladder. This holds with but one exception and that is in the case of pedunculated submucous fibromata that are pushed out of the cervix, bleed and break down. These fibromata are so likely to cause infection during

labor that they should be removed as soon as diagnosed. In removing them, the asepsis must be perfect or disaster may follow.

(c) About 80 per cent of labors complicated by fibromata terminate normally. The remaining 20 per cent may necessitate: forceps, cesarean section or perforation. The position, size, and consistence of the fibroma are the determining factors in precipitating complications of labor.

As regards position, we may recognize two great divisions: (1) the fibromata that occupy the abdomen and leave the pelvic canal free; and (2) the pelvic fibromata that obstruct the canal.

(1) Abdominal fibromata do not generally produce dystocia. However they may cause several anomalies, such as, retardation of uterine contractions leading to a longer labor, retardation of engagement of the head with increased likelihood of early rupture of the membranes, prolapse of the cord or hand, and abnormal presentations.

(2) Pelvic fibromata will cause dystocia unless they are very small and soft or can be pushed up out of the pelvis or rise out of the pelvis spontaneously by retraction. As regards volume, according to Tarnier, dystocia begins when the fibroma reaches the size of a hen's egg.

Just so soon as it can be demonstrated that the fibroma obstructs the pelvic canal and will not become abdominal, cesarean section is indicated. If labor is terminated by any other obstetrical operation, the fetal mortality is from 55 to 88 per cent and maternal mortality from 34 to 76 per cent. Cesarean section will result in the greatest success if performed before rupture of the membranes, at the beginning of labor, and when not preceded by vaginal examination. Reeb counsels against removing the tumor abdominally, and then terminating the labor with forceps. The dangers for the child are too great. He also counsels against the vaginal removal of the tumor followed by delivery. Of 14 such cases reported by Troell, only four children lived, and one mother died of infection.

Cesarean is the operation of choice. After removal of the child, if the woman is young and the fibroma is enucleable, it should be enucleated. If after removal of the fibroma, one fears the consequences of another pregnancy because of a weakened wall, the woman should be sterilized by resection of the tubes. If, on the contrary, enucleation of a pelvic fibroma is not possible, if the body of the uterus is filled with other fibromata, or infection is suspected, hysterectomy should be performed, no matter what the age of the patient. In the case where enucleation is not feasible and a secondary vaginal enucleation is possible later, in young women were hysterectomy is to be avoided if possible, Reeb recommends the classical cesarean followed by the vaginal enucleation several weeks later.

Following delivery, retained placentas requiring manual removal are not uncommon. Hemorrhage may obtain from uterine inertia and is to be stopped by the usual means. If hemorrhage is caused by a submucous fibroma, enucleation may be indicated immediately, while good access is still possible.

(d) In the puerperium, involution is nearly always retarded. Repeated hemorrhages are frequent. Traumatization of the fibroid easily leads to infection. Torsion may take place and necrosis follow. Though most fibromata involute with the uterus, some fibro-myomata may increase rapidly in size and cystic degeneration may obtain.

Long continued supervision during the puerperium is imperative. In

the absence of complications, it is best not to intervene soon after delivery. After eight weeks the indications for operation are the same as for the treatment of the nonpregnant women and operation is easier and not fraught with as many dangers as would obtain immediately after delivery.   R. T. LaVake.

Stiassnie: Ovarian Cyst Complicating Pregnancy. Progrès Médicale, 1920, No. 42, p. 489.

Stiassnie, in a general review of both the literature and his own cases finds that the influence of an ovarian cyst on pregnancy depends largely upon the time when, in the course of that pregnancy, the cyst becomes active. If this occurs during the antepartum period, especially in the earlier months, the cyst may cause a displacement of the uterus. Again, it may become the cause of an abortion in about 12.5 to 20 per cent of cases at about the third or fourth month of pregnancy. Changes may also be seen in the cyst during this period, the most common of these being a rapid increase in its volume, a secondary malignant degeneration or a torsion of the cyst pedicle.

When the pregnancy has progressed to the point of labor the influence which a cyst may exert depends largely upon its location. Ninety-five per cent of the cases complicated by an abdominal ovarian cyst will be delivered spontaneously, although cysts of this type may cause malpositions and prolonged engagement. Quite the opposite is true of pregnancies complicated by pelvic cysts, as such patients are seldom delivered spontaneously but develop secondary inertia and demand an operative termination of the labors.

During the puerperium a cyst may develop a twisted pedicle, this being especially true in those cases in which there is a rapid involution of the uterus. On the other hand, they may delay involution and thus expose the uterus to secondary infection.

The diagnosis of an ovarian cyst is usually made during the routine examination of the pregnant woman. At times, however, it becomes difficult to differentiate it from hydramnios, twin pregnancy, fibroid or ectopic pregnancy.

The treatment also is governed by the stage to which the pregnancy has developed. If early, the only safe procedure is ovariotomy. Stiassnie claims that there is practically no danger of abortion from this procedure. On the contrary, when the pregnancy is near term, he advises strongly the use of a palliative treatment until term is reached at which time he employs cesarean section followed by ovariotomy. During the puerperium, if the cyst is causing sufficient trouble to warrant any interference at all, ovariotomy is the procedure of choice.

THEODORE W. ADAMS.

Koehler: Ileus and Peritonitis During Pregnancy, Labor and Puerperium. Wiener klinische Wochenschrift, 1921, xxxiv, 937.

These grave complications of pregnancy and the puerperium are uncommon. Less than 100 cases of such an ileus have been reported in the literature, to which four new observations are added. (1) Ileus on the second day after the third normal labor. Operation two days after beginning of symptoms. Findings: Obstruction at splenic flexure by a

band, which was cut and a colostomy made at the middle of the transverse colon. Death on fourth day after operation. Autopsy—Dilatation of intestine, beginning peritonitis. (II) Ileus six weeks after the fourth normal labor. Operation three days after onset. Findings: Much cloudy fluid. Intussusception of 40 cm. of ileum through the ileo-ceeal valve into colon, not reducible; enterostomy above obstruction; drainage. Death on day after operation. Autopsy: The above plus necrosis of the invaginated ileum and beginning peritonitis. (III) Ileus at eighth month of sixth pregnancy. Operation day after onset. Vaginal Cesarean followed by a laparotomy. Findings: A kink at the middle of the small intestine with a construction ring, ten inches above which was a tear in the serosa of the intestine the size of a silver dollar. The ring disappeared on manipulation of the intestines and the tear was sewed over so as to invaginate it. Did well for six days, passing feces and gas. Died on the eighth day from cardiac failure. Autopsy: Localized peritonitis, pulmonary edema, dilatation of heart. (IV) Patient had five normal labors, and an operation for extrauterine eighteen months previous to present illness. Ileus in fourth month of seventh pregnancy, Operation day of onset. Findings: Bloody fluid; a band across the ileum with gangrenous intestine; resection with anastomosis; drainage. Miscarriage on next day necessitating manual removal of placenta. No feces or gas passed. Died on third day. Autopsy: Diffuse Peritonitis.

In these four cases the diagnosis was easy. Fleishauer says that it is more difficult in the pregnant than in the nonpregnant. There seems to be no connection between the number of pregnancies and ileus. Of thirty-five cases in literature, nine had one previous pregnancy, seven had two, and nineteen more than two. Age seems to be of no influence. Various authors give the period of commonest occurrence as from the second to the ninth day of the puerperium.

There is no rule as to the causation of the ileus. The author believes that in his third case there had been an intussusception which had released itself before the laparotomy, as a result of emptying the uterus. The chance of a pregnant uterus causing ileus by pressure is slight (Wilms) but it perhaps increases the chance of ileus in the presence of a preformed pathological condition.

Planchu advises emptying the uterus in the hope that the obstruction will loosen as a result of the changed intraabdominal conditions. Essen-Moeller suggests doing this when the child is viable by a vaginal Cesarean. Several authors (Roelsing, Ludwig, and others) recommend doing the laparotomy first because if the uterus is emptied its contraction may cause a pull on adhesions resulting in tearing a hole in the intestines. The author believes the decision depends on conditions met in the individual case.

Koehler also saw the following two cases of peritonitis:—(1) Patient was seven months pregnant, had active tuberculosis of the lungs, and signs and symptoms of peritonitis. She started spontaneously in labor and had a normal delivery. The abdominal condition was better for five days when symptoms recurred and she died on the sixth day. Autopsy: Pulmonary tuberculosis. Intestinal tuberculosis with perforation and peritonitis. (II) Patient in eighth month of third pregnancy. Symptoms and signs of peritonitis in lower abdomen for twenty-four hours. Started in labor, normal delivery in sixteen hours. Collapsed

and died a few hours later. Autopsy: Diffuse peritonitis, acute purulent salpingitis, parovarian abscess, myocarditis.

The diagnosis and treatment of peritonitis connected with pregnancy is the same as without pregnancy. Many authors note that the intoxication from the peritonitis starts the patient in labor.

<div align="right">F. A. PEMBERTON.</div>

Constantinesco: Cesarean Section in Treatment of Wounds Penetrating the Abdomen and a Pregnant Uterus, La Présse Mèdicale, February 16, 1921, p. 135.

The author considers this condition an additional indication for performing cesarean section. The patient, a woman 32 years old, was injured in the abdomen by being hooked with a horn. She entered the hospital the morning of the accident. Examination showed a breech presentation, almost at term; heart tones present; no sign of labor; some bleeding and considerable pain. The wound in the right flank was angular in shape; hemorrhage insignificant; amniotic fluid apparently escaping. Immediate operation was performed: The edges of the wound were excised. The umbilical cord protruding through the wound was followed to the opening in the uterus which was 5 or 6 cm. long. Protruding through this wound was also the right arm of the fetus. The wound of the uterus was enlarged and a well developed fetus delivered. The uterus contracted. The wound in the uterus was sutured after removal of the placenta. Abdominal drainage was employed, also posterior vaginal drainage. An uninterrupted recovery followed.

The author considers three possibilities for handling such cases: (1) Closure of the uterine wound after replacing any prolapsed parts. (2) Treatment of abdominal wound according to well recognized procedures and delivery of child through the vagina. (3) Method employed by the author, which he considers to be preferable. Conclusions: (1) Penetrating wounds of the abdomen and uterus without infection should be operated immediately by conservative cesarean section and use of double drainage. (2) Penetrating wounds of the abdomen and uterus with infection, i.e., if patient is treated after 24 hours, should be operated by cesarean section with total hysterectomy. Employment of drainage as necessary.

<div align="right">F. L. ADAIR.</div>

Ebbinghaus: Vesical Stone as Obstacle in Delivery. Zentralblatt fuer Gynaeckologie, 1921, xlv, 676.

Second pregnancy of the patient was greatly disturbed by bladder symptoms. On examination a firm immovable tumor is discovered lying behind the symphysis, undeniably representing the mechanical obstacle which prevented the head to descend. A diagnosis of tumor at the base of the bladder extending into the upper portion of the urethra was made.

Through a vaginal incision a vesical stone, measuring 6 by 4½ cm., and weighing 30 gm. was removed. After the operation a normal child was born without further difficulty. During normal puerperium leakage occurred through a small fistular opening, which later was successfully repaired.

The stone was a phosphatic concretion around a piece of old rubber tubing. During labor the advancing head had pushed its front end into the urethra.

H. M. LITTLE.

Jaques: A Case of Pregnancy After Sub-total Hysterectomy. Schweizerische Rundschau für Medizin, 1921, xxi, 274.

Woman, twenty-four, had a subtotal hysterectomy on January 20, 1908, for persisting pelvic suppuration. Both tubes and the right ovary were also removed. The cervix was left unsutured to improve drainage and the left ovary was covered with peritoneum.

On July 18, 1921, patient reappeared with symptoms of pregnancy (since April) and a tumor simulating a three months' pregnancy with softened cervix, pigmented areolas and enlarged Montgomery's follicles. No fever. A colpotomy was performed under the diagnosis of pelvic suppuration and a nine cm. fetus and secundines removed.

The author believes that this pregnancy was made possible by the subperitoneal fixation of the ovary close to the unsutured cervix.

L. A. CALKINS.

Item

THE TWO HEGAR SIGNS OF PREGNANCY

By G. L. Moench, M.D., New York City

WHEN Hegar first published his observations on the early uterine changes of pregnancy, he described two very characteristic signs. The first of these is known the world over as Hegar's sign and consists in the softening of the lower uterine segment. The second Hegar sign, the production, by proper technic, of a definite fold in the anterior uterine wall, as shown in Fig. 1, I have looked for in vain in every American textbook or article on obstetrics within my reach.

Furthermore, not a single one of the undergraduate or postgraduate students to whom I have described and demonstrated this sign had ever heard of it before.

It seems to have been consigned to total oblivion and, in my opinion, unjustly because, in doubtful cases where Hegar's first sign is doubtful, the other Hegar sign may be a great aid in arriving at a correct diagnosis.

To elicit the sign is easy enough, its only possible disadvantage may lie in the fact that the examiner needs help from a second person to steady the uterus. Retroflected uteri, of course, have to be replaced before the sign can be elicited. The technic of its detection is seen clearly in Fig. 1.

As to the first sign, it is probably felt best and most easily by examining with the index finger of one hand in the rectum and pressing down on the lower uterine body segment with the other hand.

This sign, as stated in most textbooks, may be so marked that the impression is given that one is dealing with a small uterus and an ovarian cyst above it, so completely may the fingers of the two hands seem to come together.

Usually this is regarded as a probable sign of pregnancy and it is said that cystic tumors of the uterus, or softening from other causes, may produce it. Yet, Hegar himself regarded it as a positive sign of pregnancy and probably no one can remember any case in which this first sign of Hegar was typical where pregnancy was not present.

The mechanics of this sign, as also of the second, will explain why it is practically impossible, and at least very highly improbable, that either of these signs should be duplicated by any other condition of the uterus. It is true that some degree of softening and compressibility of the lower uterine segment can and does occur in many other conditions, in fact it is found before each menstrual period, but the compressibility is always limited. It is further true that in some cases of pregnancy, due to complications, the signs may not be absolutely typical so that a negative finding here will not definitely rule out pregnancy. This, however, does not alter the fact that the presence of Hegar's first, second, or both signs is a positive sign of pregnancy.

Let us consider the mechanics of the production of these signs, taking up Hegar 1. It may at first seem that the general softening of the uterine substance in pregnancy is responsible for the compressibility found in the lower uterine segment. There is, however, more than that to be considered. Fig. 2,A, may represent the normal pregnant uterus. Now, if we compress the lower segment, not only are the soft walls compressed, but the amniotic sac is pushed up,

bulging the upper uterine body as shown in Fig. 2,*B*. This can happen only because the following factors are present: (1) Thinning out of the uterine walls; (2) softening of the uterine walls; (3) an encapsulated fluid content of the uterus. The last factor is the most important. The greatest compressibility is, therefore, pro-

Fig. 1.—Method of demonstrating Hegar's second sign of pregnancy. The uterine wall is shown solid black. The index finger of the right hand of the examiner is pushing up the vaginal wall. Between his two hands is the fold of the anterior uterine wall. The hand of an assistant is preventing the uterus from escaping backwards.

A   *B*
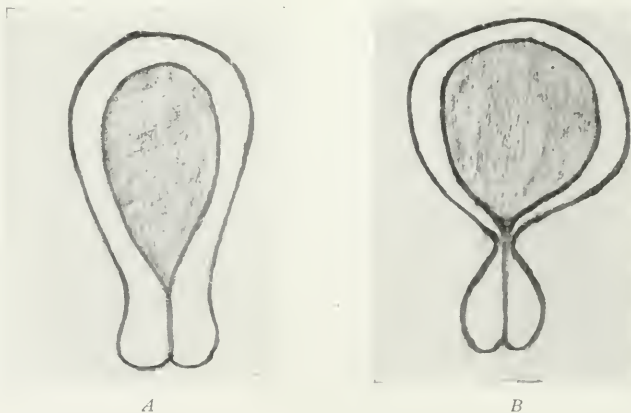
Fig. 2.—The shaded portions represent the amniotic cavity. In *A* is the pregnant uterus in its normal state. In *B* the lower uterine segment is compressed. Note the shortening of the long diameter of the amniotic sac and the bulging of the corpus uteri above the point of pressure.

duced not by compression of the uterine walls, but by the moving out of the way of the amniotic fluid. That is, the uterine wall is movable to some extent on its fluid content and, furthermore, the soft, enlarged, musculofibrous bundles

which run more parallel in a pregnant than in a nonpregnant uterus, move upon one another.

If we have a hyperemic enlarged uterus the walls are thicker, not thinner, as in pregnancy and we can indent the wall but never bring out examining fingers practically into direct apposition.

Again, a cystic uterus, even granted we have softening and thinning of the walls instead of a fibrosis as is usually the case, will not give a typical Hegar first sign. In the presence of a cyst, the size is determined by the pressure of the fluid in it; therefore, its walls are more or less tense and it cannot be compressed to the extent of a pregnant uterus, because the uterine walls themselves form the cyst wall and the fluid has no place to escape. If, on the other hand, the fluid contents were not under much pressure, then the uterine walls would immediately contract down upon the fluid and so become thicker and less compressible or, if the walls were very thin and had lost their contractility, the uterus would sag, in which case pregnancy would hardly be simulated.

The important factor in the mechanical production of this sign of pregnancy is that the uterine wall moves on and over the wall of the cyst within.

The mechanism of Hegar's second sign is absolutely identical with the mechanism of the first, except that it is still more evident that we require as a prime requisite an encapsulated fluid content over which the softened uterine wall can move.

Of course, it is possible to conceive conditions, other than pregnancy, which would mechanically satisfy all the prerequisites on which both of Hegar's signs depend, and insofar it is theoretically correct to call both of the signs described only probable signs of pregnancy.

Practically, however, such conditions must be so extremely rare that I believe we can safely agree with Hegar and his pupils in stating that the presence of these two signs in their typical form spell pregnancy and nothing else.

616 MADISON AVE.

Book Reviews

A Text Book of Gynecological Surgery.—By COMYNS BERKELEY, M.A., M.C., M.D. Cantab., F.R.C.P. (Lond.), M.R.C.S. (Eng.), Gynecological and Obstetric Surgeon to the Middlesex Hosp., Senior Surgeon to the City of London Lying-in Hospital, Surgeon to In-patients at the Chelsea Hospital for Women, Consulting Gynecologist to the Eltham Hospital, Examiner in Diseases of Women and Midwifery to the Universities of Oxford, Cambridge and London; sometime Examiner to the University of Leeds, the Conjoint Board of England and the Society of Apothecaries, London, and Victor Bonney, M.S., M.D., B.Sc. (Lond.), F.R.C.S. (Eng.), M.R.C.P. (Lond.), Assistant Gynecological and Obstetric Surgeon to the Middlesex Hospital, Surgeon to In-patients at the Chelsea Hospital for Women, Gynecologist to the Putney Hospital, the Miller Hospital and the Hospital for Epilepsy and Nervous Diseases, Maida Vale; Examiner in Diseases of Women and Midwifery to the Conjoint Board of England; formerly Hunterian Professor, Royal College of Surgeons of England, and Emden Research Scholar, Cancer Investigation Laboratories, Middlesex Hospital. Second edition, with 489 figures in the text and 16 color plates. New York, Paul B. Hoeber, 1920.

The present volume is the second, enlarged and revised edition of Berkeley and Bonney's now well-known and valuable book on gynecological surgery. Its publication was intended for the Autumn of 1914, but the advent of the great war compelled its postponement. Advantage was therefore taken by the authors of the advances in surgery of the female genitals to make many alterations in the text and many additions also. The treatment of shock with especial reference to blood transfusion based upon the war experience has been a notable addition to the book. Another chapter upon the mechanism of the supports of the genital canal has been added so as to lay the foundation for the particular type operation to be performed for the relief of displacements.

The three chapters upon the complications of pregnancy, labor and the puerperium by ovarian tumors, uterine myomata and cancer of the cervix are especially illuminating in view of the great personal experience of the authors. We note with considerable satisfaction the new chapter on abdomino-perineal excision of the rectum for carcinoma. The very valuable chapters on postoperative treatment, postoperative complications and on immediate and remote results of gynecological operations have been considerably enlarged and brought up to date.

The book is perhaps the most complete text book on the subject of gynecological surgery written in English. It satisfies the requirements of the experienced gynecological surgeon who may desire to compare his own methods and results with those of two distinguished and mature surgeons. It also covers the whole field of technic, operative indications, dangers and risks, so completely as to be of the

most helpful service to those who intend to specialize in this department of surgery. The illustrations are very abundant and while they are only line drawings for the most part, they are especially clear and instructive.

Gynäkologisches Vademekum. Für Studierende und Ärzte.—By PROF. DR. A. DÜHRSSEN. Berlin. with 138 illustrations in text and 11 plates. 13th and 14th revised edition. Berlin, Verlag Von S. Karger, 1920.

The present small handy volume of gynecology combines the 13th and 14th editions. Few changes are noted. Brief mention is made of some of the advances in gynecology. Except for a rapid review of the subject by a student preparatory to taking his examinations, the book cannot be regarded as having any other value.

Geburtshilfliches Vademekum.—"A Handy Volume of Obstetrics." By the above author.

This little volume is far better than its companion. Progress in obstetrics does not proceed in leaps and bounds. The advances in the past years in this field of medicine have not been epoch-making. Dührssen's little book gives a good survey of the subject even if he emphasizes his own contributions to obstetrics perhaps unduly. This is pardonable in the author of the Vaginal Cesarean which was devised 25 years ago and in commemoration of which he has incorporated in this edition a complete description of the operation with improved and increased illustrations.

Book Notices

Acknowledgment is made of the receipt of the following book, a selected review of which will appear in an early number.

THE GLANDS REGULATING PERSONALITY. By DR. LOUIS BERMAN. New York, 1921, The Macmillan Company.

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